Phycological Bulletin

No. 4

MAY, 1956

Issued by
The British Phycological Society

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BRITISH PHYCOLOGICAL BULLETIN

No. 4. MAY 1956

Honorary Editor:
Elsie Conway,
Department of Botany,
University of Glasgow.

(With the assistance of Dr Betty Moss)

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SUMMER MEETING AT FERRY HOUSE (FRESHWATER BIOLOGICAL ASSOCIATION) FAR SAWREY ON LAKE WINDERMERE - SEPTEMBER 8th. - 15th. 1955.

By kind permission of the Director of the Freshwater Biological Association a field meeting was held at the laboratories at Far Sawrey on Lake Windermere from September 8th - 15th 1955. 39 Members and 3 students attended this meeting organized by Dr J. W. G. Lund assisted by Miss B. Douglas.

On arrival at Ferry House during the evening of September 8th. members were welcomed by Dr Lund who outlined the plans for the meeting.

Friday, September 9th. The first day was devoted to demonstrations of recording physical data on lakes and sampling methods together with a visit to the famous Esthwaite North Fen. Dr C. H. Mortimer demonstrated methods of temperature recording by means of reversing thermometer and electrical thermistors, light penetration by photo-electric cells, Friedinger water bottle sampling, and 5 m. tube sampling for plankton and net collecting. Samples of plankton and dredged epiphytic material were collected from Esthwaite Water and from Lake Windermere and the evening was spent identifying the Algae in these samples. The visit to Esthwaite Fen enabled members to see the structure of this classic habitat and to collect algae from the Fen pools.

During the evening Dr Lund gave a most informative and entertaining lecture ranging from novel ideas on the chemistry of the rocks of the area, through Bryophyte ecology to the history of the Windermere plankton, its complexities, anomalies and present confused theories. Professor L. Newton, on behalf of all present thanked Dr Lund, after which the meeting dissolved into discussion of the intricacies hinted at in the lecture.

Saturday, September 10th. Most members participated this day in an excursion to the North-western lakes. The journey passed through the interesting central Borrowdale Volcanic region via Rydal Water, Grassmere and Thirlmere and on to Bassenthwaite water where boat parties collected plankton and shore parties chipped and scraped in the littoral zone. After lunch at the Anglers Hotel on the shore of Lake Ennerdale a concerted but a fruitless effort was made to find and collect *Hydrurus foetidus* from the becks. However many other interesting samples were collected whilst some intrepid members ventured on to the lake in a leaking boat. The return journey was made via the Whinlatter Pass to Keswick including a diversion to see Buttermere, Crummock and the "Fish Inn".

Sunday, September 11th. Members visited the Leven estuary, and collections were made in the marine and brackish regions of the shore and salt marsh. The paths to and from the estuary led through the ecologically interesting Roundsea wood with its alternating regions of Carboniferous limestone, on which stands of *Taxus baccata* were observed, and Silurian slates on which sessile oak and birch woods occured. Later the party ventured via Molinia tussocks and water holes on to Deer Dyke Moss where collections were made in the Sphagnum pools.

Monday, September 12th. A whole days excursion was taken to the coast at St. Bees, where collections were made from various shore levels. The flora proved to be rather poor but this enabled the various zones to be thoroughly searched.

During the evening a series of interesting demonstrations were exhibited by Professor Isaacs (Marine Siphonales of S. Africa), Mr G. Smith (Marine Siphonales from W. Australia), Dr K. Drew Baker (Freshwater species of *Batrachospermum*), Mr E. A. George (Field microscope) and Mr C. H. Selby (Ecology and Cytology of *Coleochaete* species). Later Professor L. Newton and Dr B. Moss showed colour photographs taken during the Second International Seaweed Symposium in

Norway and Dr Prouse showed photographs of the Sudan. The Society were pleased to entertain the Director of the F.B.A. Mr H. Carey Gilson and Mrs Gilson during the evening. The Director made a speech of welcome to the Society and Professor L. Newton responded on behalf of the Phycologists.

Tuesday, September 13th. During the morning Miss B. Douglas demonstrated sampling techniques in a mountain stream and talked about aspects of her work.

In the afternoon Dr C.H. Mortimer explained with the aid of a model tank some of the aspects of stratification of lakes and the effect of the earth's rotation on this phenomenon. Mr F.J. Mackereth spoke of the quantities and origin of some of the ionic constituents of the tarn and lake waters and demonstrated some of the analytical methods used in his laboratory to determine these.

In the evening Dr H.M. Lund demonstrated photomicrographs and drawings of algae and chytridiaceous fungi attacking various species of algae.

All these demonstrations were greatly appreciated by the members and our thanks to the demonstrators were expressed by the President, Professor L. Newton.

Wednesday, September 14th. This last day was spent on a visit to the Langdale valley where the majority climbed Bow Fell via the Band and down via Angle Tarn and Rossett Ghyll. Collections, notably of *Batrachospermum,* were made at Angle Tarn.

In the evening Professor L. Newton thanked Dr J.W. Lund on behalf of the members present for the excellent organisation of the meeting and presented tokens of appreciation from the members accommodated at Ferry House to Miss Perry and Miss Walker, whose meals and kindness was appreciated by all. Dr Lund in reply said he hoped the Society would return again to Ferry House and renew their acquaintance with this region rich in phycological treasures.

F.E. ROUND.

FOURTH ANNUAL GENERAL MEETING : LONDON, 4TH. JANUARY, 1956.

By kind permission of Professor P.H. Gregory, a one-day meeting of the Phycological Society was held in the Department of Botany, Imperial College of Science & Technology, Prince Consort Road, London, S.W.7., on Wednesday, 4th. January 1956. Professor Gregory and Mr F. Howarth kindly made most of the local arrangements, and about 60 people attended various parts of the meeting. Some 15 members were accommodated in Imperial College Hostel through the kindness of the Hostess, Miss C. Sherwood.

The programme consisted mainly of a **Symposium on marine algal ecology and systematics,** occupying the morning and part of the afternoon, followed by **Demonstrations** and tea, and the proceedings ended with the **Fourth Annual General Meeting.**

At 10.30 a.m. the President, Professor L. Newton, took the Chair for the morning session and welcomed members to the meeting; in particular we were pleased to see a number of our overseas members present. The following papers were then read (see authors' abstracts at end of this report):

1. Professor W.E. Isaac (Univ. of Cape Town): Some characteristics of the South African seaweed flora, with special reference to Siphonous Chlorophyceae.

2. G. G. Smith, Esq. (Univ. of Western Australia): The ecology of Siphonales occurring near Perth, Western Australia.

   The following members contributed to an interesting discussion of these papers - Professor Newton, Mr R. Ross, Dr E. M. Lind, Miss Y. Chamberlain, Dr M. Parke, Mr G. Knox and the two speakers.

3. Miss J. M. Graves (Univ. of Cape Town): Observations on the life-history of *Porphyra capensis.*

   Dr K. M. Drew Baker, Mr P. W. Carter and the speaker contributed to a discussion of this paper, and a summary of Dr Baker's contribution is included among the authors' abstracts.

4. Dr K. M. Drew Baker (Univ. of Manchester): The generic names *Goniotrichum* Kütz. and *Erythrotrichia* Aresch.

   Mr R. Ross spoke on some of the nomenclatural difficulties discussed by Dr Baker.

5. Dr M. de Valéra (Univ. College, Galway): The form-range of the *Laurencia spp.* on the west coast of Ireland.

Professor Newton thanked the speakers for their very interesting papers, and at 12.50 p.m. members adjourned for lunch at the nearby College refectories.

At 2.00 p.m., Dr M. Parke (Vice-President) took the Chair, and the following papers were read:

6. A. J. Lacey, Esq. & Dr B. Moss (King's College, Newcastle-upon-Tyne): The autecology of *Halidrys siliquosa* (L.) Lyngb. (Read by Dr B. Moss).

   Mr H. T. Powell, Professor Isaac and the authors took part in a discussion of this paper.

7. Dr E. M. Burrows (Univ. of Liverpool): A preliminary survey of the sublittoral algae of Port Erin Bay, Isle of Man.

   Dr Parke, Professor Isaac, Dr E.M. Delf, Mr E. Jones and the speaker contributed to a discussion of this paper. Dr Parke thanked the two afternoon speakers for their stimulating papers, and then proposed a vote of thanks to Professor Gregory and Mr Howarth for welcoming the Phycological Society to Imperial College and for all the kindly hospitality and help shown to us by themselves and by other members of the staff of the Botany Department. All present heartily acclaimed these remarks.

Members then spent an all too short period looking at demonstrations set up in two nearby rooms and mostly relating to the papers read during the Symposium, and afterwards had tea in the refectory.

THE FOURTH ANNUAL GENERAL MEETING started at 4.00 p.m., with the President (Professor L. Newton) in the Chair. There were 39 members present.

MINUTES

1. **Letters from Members.** The Secretary reported that letters had been received from Dr G. C. Ainsworth, Professor J. H. Burnett, and Miss B. T. Chiu (Hongkong) - all regretting that they could not attend the present meeting and sending good wishes for its success.

2. **The Minutes of the Third Annual General Meeting,** held at Bedford College, London, on 4th January 1955, had been circulated to all members in Phycological Bulletin No. 3. The minutes were now approved, and the Chairman signed the official copy.

3. **Matter arising from (Item 5 of) the Minutes.** The Secretary stated that Council had appointed Dr E. Conway to serve as Editor of the Phycological Bulletin.

4. **Report from Council:**

(i) **Report of Hon. Secretary.** Mr H. T. Powell reported on the meetings and other activities of the Society during the year 1955, as follows: (a) **Meetings:** the Society held two general meetings in 1955 - a one-day meeting at Bedford College, London (the Third A.G.M.) on 4th January (see full report in Bulletin No. 3); and the 7-day summer Field Meeting at the Ferry House, Ambleside, September 8th-15th. Dr J.W.G. Lund kindly acted as Local Secretary for the very successful meeting at Ferry House and somehow or other managed to find accommodation for all of the 43 people who attended, either in the Ferry House itself or in lodgings, hotels and Youth Hostels not far away; (a report of this meeting is included elsewhere in the present Bulletin). (b) the 1955 **Council** met on three occasions, as follows: 4th Jan. (Bedford College), 11th September (Ferry House), 4th Jan. 1956 (Imperial College). (c) Reports from the Secretaries of our two **subcommittees**, and from the Editor of the **Phycological Bulletin**, are given below. (d) **Membership** of the Society is 99 at present, compared with 102 a year ago. Some members have left the Society for various reasons, usually because of retirement or change of occupation; but during the year 6 members have joined the Society and we extend a warm welcome to them; the new members are: Professor J.H. Burnett (Univ. of St. Andrews), Miss B.T. Chiu (Hongkong), Professor W.E. Isaac (Univ. of Cape Town), Mr C.H. Selby (Queen Mary College), Mr G.G. Smith (Univ. of Western Australia), and Mr T. Sreeramulu (at Imperial College). The Secretary would welcome from members any corrections or additions to the List of Members, with addresses and interests, printed in Bulletin No. 3.

Professor Newton thanked the Secretary for putting in a lot of work in running the Society and in helping to produce Bulletins during the year, and the report was adopted.

(ii) **Report of Hon. Treasurer.** Dr M.T. Martin regretted that it had not been possible to complete the annual audit in time to circulate copies of the Statement of Accounts to members before the present meeting. However, copies were now distributed and Dr Martin explained the Income and Expenditure Account and the Balance Sheet for the year ended 3rd November 1955 (see copy at end of this report), which shows a favourable balance at the bank of £157. The cost of printing Bulletin No. 3 (about £46) has to be deducted from this balance, and all subscriptions for 1955 have now been received. Dr Martin expressed her thanks to the two auditors (Dr G. C. Ainsworth and Professor W.T. Williams) for help in preparing the financial statement. The Chairman congratulated the Treasurer and auditors on the sound financial position of the Society and thanked them for their work on behalf of the Society; the report was adopted.

(iii) **Report of Hon. Editor of Phycological Bulletin.** Dr E. Conway reported as follows:

"During 1955 two numbers of the Bulletin have appeared: No. 2 (which was largely the compilation of Mrs Nelson) in the spring, and No. 3 in the late autumn. In response to a number of requests, a re-issue has been made of Bulletin No. 1 (originally brought out in 1952) in order that all the early numbers might be obtainable in the same format. These numbers now record the activities of the Society up to the A.G.M. of the Society in January 1955. It is hoped that Bulletin No. 4 will appear in the early summer of 1956 with reports of Society activities up to the end of the A.G.M. January 1956. After this it is proposed that an annual issue of the Bulletin shall be brought out, recording the activities of the Society for one year, ending with the A.G.M.

These three numbers have been circulated to members: Nos. 1 and 2 being sent to all those who have joined the Society since its inception; No. 3 to all present members, but not to the very few who have failed to pay subscriptions for the past two years.

Bulletin No. 2 was circulated to the heads of all University Botany Departments and to Marine Research Stations; and with the issue of Bulletin No. 3 a scheme has been drawn up whereby libraries and institutions may subscribe to the Bulletin at a cost of 7/6d. per issue. The initial response to this scheme has been encouraging."

Dr Conway added that helpful suggestions with regard to the form of the Bulletin would be welcome, and asked members to send in items of general interest to phycologists (but not original papers) and to inform their libraries of the scheme just mentioned. Professor Newton thanked Dr Conway for her work with the Bulletin, the publication of which was an important activity of the Society. (The report had been adopted by Council).

(iv) **Report of Secretary of Subcommittee for Marine Algal Check-List & Flora.** Dr E.M. Burrows reported as follows:

"Two changes have been made in the personnel of the subcommittee during 1955: Dr M. Naylor is helping Dr Blackler with responsibility for the Phaeophyta in place of Dr Parke who is now concerned exclusively with small forms; and Dr P.S. Dixon replaces Dr S. Nelson to help with the Chlorophyta.

The Society's stock of algal record cards is now held by Dr Burrows as Secretary of this subcommittee. For an experimental period in the first instance, the Society is to bear the cost of replacing completed cards received from members. A stock of cards is held at Plymouth for this purpose.

Two meetings of the subcommittee have been held during the year, at both of which discussions have been concerned with the proposed new Flora of British Marine Algae. Both the form the flora is to take, and also plans for its publication have been discussed. Although a number of promising lines of inquiry are open, so far no definite plans have been made for publication; these cannot be made until at least a part of the work is nearing completion. It may be necessary to publish the flora as a series of separate parts, each dealing with a special group. It is suggested that members of the committee responsible for special groups should have complete freedom to decide the content of the part, but an attempt is being made to arrive at some uniformity with regard to format and illustration, at least between the parts dealing with groups of larger algae. Reports from members of the committee show that the necessary data for the flora is accumulating, but work is slow and help from persons giving monographic treatment to algal genera is urgently needed for all groups.

Although priority is now being given to the Flora of Marine Algae, work is also proceeding on the Biological Flora and one or two species descriptions are almost ready for publication.

Corrections to be made to Dr Parke's "Preliminary Check-list of British Marine Algae" will be recorded in future issues of the Phycological Bulletin, as they become available.

This subcommittee keeps a record of information concerning the following:-

1. The whereabouts of type specimens.
2. Where members of the British Phycological Society have deposited holotypes.
3. The whereabouts of classical herbaria and the finding of local floras.
4. The whereabouts of important collections of marine algal slides, including cytological slides.

Information concerning any of the above will be welcomed by the committee.

During 1955, two herbaria have been incorporated in the algal herbarium of the University of Liverpool:- a collection of Anglesey algae made by H.C. Hiller, a bequest to the University; and a collection of Manx and other algae, the gift of Dr S.M. Nelson."

The Chairman thanked Dr Burrows for her report, which had been adopted by Council.

(v) **Subcommittee for Algal Nomenclature.** Mr R. Ross (Secretary of this subcommittee) had reported to Council that the committee had had no occasion to meet during 1955 and so had nothing to report. The new Code of Nomenclature, as revised at the Paris Congress, had gone to press at the end of March 1955, but was not yet available.

5. **The Programme for the Field Meeting** to be held at The Field Studies Centre, Dale Fort, Pembrokeshire, September 19th-26th 1956 was next discussed. Professor Newton described the location of Dale Fort, the facilities available there, and the possibilites for collecting on nearby shores. Not many microscopes were available, but probably some could be provided from Aberystwyth. Members' cars would be very useful to supplement local transport for excursions. Dr Parke suggested including an excursion to a good salt-marsh and it was agreed that the area of the river Gann estuary would be very suitable. It was agreed that talks from Professor Newton, Mr J.H. Barrett (the Warden), and possibly also from other people who have worked in the district, would be useful. It was left to the Secretary and President to arrange a suitable programme in consultation with Mr. Barrett, and to include a visit to the island of Skokholm if possible. The Secretary remarked that the Society might usefully undertake to extend the "Preliminary Marine Flora List" already compiled at Dale Fort.

6. **Amendments to the Constitution & Rules.** The following four amendments to the Constitution (all put forward by Council) were considered and unanimously approved:

(i) **Revise the second sentence of Clause 5 to read** as follows:
"The first subscription paid by any member joining the Society within the last two months of the calendar year shall also cover the succeeding year."

(ii) **Revise Clause 9 to read** as follows: "The business of the Society shall be conducted by a **Council of Members** consisting of the 5 Officers of the Society, namely, the President, two Vice-Presidents, the Honorary Secretary and the Honorary Treasurer, together with the immediate past-President, **the Honorary Editor of the 'Phycological Bulletin'** (ex-officio), and not more than 6 Ordinary Members of Council; five to constitute a quorum. All members of Council, except the immediate past-President **and the Hon. Editor**, shall be elected by postal ballot, the result of the ballot being declared at the Annual General Meeting (see Clause 14)."

(iii) **Add a new clause** as follows:

"10. (d) The Honorary Editor of the 'Phycological Bulletin' shall be elected annually by the Council.

(iv) **Add** the following **new paragraph** to the end of Clause 14:

"Any problems arising through nominees for Council receiving the same number of votes will be resolved by a further vote of the members present at the Annual General Meeting".

7. **Election of Auditors for 1956.** It was proposed by Dr Martin, seconded by Dr F. Round, and agreed, that Dr G. C. Ainsworth and Professor W. T. Williams be asked to continue serving as Hon. Auditors to the Society.

8. **Election of Officers and Members of Council for 1956.** The following Officers were now re-elected to the 1956 Council: **President:** Professor L. Newton; **Vice-Presidents:** Dr J. W. G. Lund, Dr M. W. Parke; **Hon. Treasurer:** Dr M. T. Martin; **Hon. Secretary:** H. T. Powell.

Five nominations had been received for three vacant offices of **Ordinary Member.** The result of the postal ballot for these offices was worked out during the course of the present meeting by Mr W. E. Jones, and the Chairman now announced that Dr M. A. P. Madge and Dr P. S. Dixon had been elected, but that the other 3 nominees had received an equal number of votes to tie for third place. A further ballot was then held which resulted in Dr J. K. Spearing being elected. All three Ordinary Members will serve for a period of two years.

Other Business:

1. Dr F. Round described and drew an alga that he had found in a cave and asked whether anyone could suggest a name for it. So far as the Secretary is aware, no-one proved very helpful!

2. Dr Baker asked if it would be possible to indicate on the annual notice asking for nominations to Council, those members who were not eligible for particular offices. The Secretary replied that he would look into this request (and, on later reflection, suggests that it would be simpler if members would consult the Lists of Members of all Councils to date, printed in Bulletins 2, 3 and 4).

3. Miss Y. Chamberlain asked whether information about the whereabouts of type-specimens and herbaria, obtained by the Check-list subcommittee, could be notified to the British Museum, and Dr Burrows took note of this request.

4. Professor Newton remarked that Professor J. Feldmann had written to send greetings to the Society and to inform her that the French phycologists had now formed a Phycological Society similar to our own and proposed issuing a Bulletin similar to ours (not connected with the "Revue Algologique"). The French Society had 50 members and hoped to invite foreign membership in due course. Members welcomed this news and it was agreed that Professor Newton should send our very best wishes to Professor Feldmann and the French Society.

There being no further business, the Chairman declared the meeting closed.

H. T. Powell, Hon. Secretary.

THE BRITISH PHYCOLOGICAL SOCIETY.
MEMBERS OF COUNCIL AND SUB-COMMITTEES FOR THE YEAR 1956.

Officers of Council.

President: Professor L. Newton.
Vice Presidents: Dr J. W. G. Lund, Dr M. W. Parke.
Hon. Treasurer: Dr M. T. Martin, University Hall, Bangor, Caernarvonshire, North Wales.
Hon. Secretary: Mr H. T. Powell, Marine Station, Millport, Isle of Cumbrae, Scotland.

Ex-officio Members of Council.

Immediate past-President: Dr K. M. Drew Baker.
Hon. Editor of Phycological Bulletin : Dr E. Conway, Department of Botany, The University, Glasgow, W. 2.

Ordinary Members of Council.

To retire December 1956:	To retire December 1957:
Dr E. M. Burrows,	Dr P. S. Dixon,
Dr M. R. Droop,	Dr M. A. P. Madge,
Mr E. A. George.	Dr J. K. Spearing.

Hon. Auditors: Dr G. C. Ainsworth, Professor W. T. Williams.

Committee for Marine Algal Check-list and Flora:
Dr M. W. Parke (Chairman), Dr E. M. Burrows (Secretary), Dr K. M. Drew Baker, Miss D. Ballantine, Dr H. Blackler, Dr R. W. Butcher, Dr P. S. Dixon, Dr M. R. Droop, Mr N. I. Hendey, Dr M. T. Martin, Dr M. Naylor, Mr H. T. Powell.

Committee for Algal Nomenclature:
Mr R. Ross (Secretary), Miss C. I. Dickinson, Mr. E. A. George, Dr J. W. G. Lund, Dr M. W. Parke.

Committee for protection of important collections and slides of Freshwater Algae:
Dr J. W. G. Lund (Secretary), Mr E. A. George, Mr R. Ross.

BRITISH PHYCOLOGICAL SOCIETY.

Income and Expenditure Account for year ended November 3, 1955.

Expenditure	£	s	d
Printing of Bulletins 1 & 2	56	10	0
Duplicating		14	9
Expenses of Ferry House meeting	3	1	7
Postages, telephone, stationery	16	9	1
Subscription to Biological Council		5	0
Bank charge (Accra cheque)		3	0
Surplus	18	9	1
	95	12	6

Income	£	s	d	£	s	d
Subscriptions received, 1955	126					
Less subscriptions received in arrears, 1954	38					
Add subscriptions in arrears, 1955	3					
				91	0	0
Sale of reprints				4	12	6
				95	12	6

BALANCE SHEET AT NOVEMBER 3, 1955.

Capital and Liabilities	£	s	d	£	s	d
Capital at November 10, 1954	152	1	0			
Less reprints sold	4	12	6			
				147	8	6
Add surplus				18	9	1
				165	17	7

Assets	£	s	d
Balance at Bank	157	13	7
Stock of reprints & record cards	5	4	0
Subscriptions in arrears	3	0	0
	165	17	7

(Signed) M.T. Martin. Hon. Treasurer.

We certify that the above Balance Sheet and Income Expenditure Account are in accordance with the books and vouchers of the British Phycological Society, which we have duly audited, and in our opinion they give a true and correct view of the transactions of the Society for the period November 10th 1954 to November 3rd 1955 and its position at November 3rd 1955.

(Signed) W.T. Williams }
G.C. Ainsworth } Hon. Auditors.

AUTHORS' ABSTRACTS OF PAPERS READ AT IMPERIAL COLLEGE, LONDON, 4th JANUARY 1956.

1. Some characteristics of the South African seaweed flora with special reference to Siphonous Chlorophyceae.

W.E. Isaac.

The coastal waters of the west coast of South Africa are subjected to the influence of the relatively cold Benguela current, while the coastal waters from Cape Agulhas eastwards are influenced by the warm Agulhas current. Cape Agulhas is the most southerly point of Africa and in this region the continental shelf is of considerable extent forming the Agulhas Bank.

Most of the Agulhas current is deflected back eastwards by this bank but at a higher latitude than that of its south-westerly flow. Due to local conditions, the sea temperatures in False Bay, immediately east of the Cape Peninsula, are abnormally high for its geographical position.

These sea temperature conditions have a marked effect on the seaweed populations of the east and west coasts. Thus the large sublittoral kelps (*Ecklonia maxima, Laminaria pallida* and, over a narrow distribution range, *Macrocystis*) which are a prominent feature of the coast west of Cape Agulhas are absent on the east coast. Further, while macroscopic seaweeds extend to high water neap-tide level (and sometimes beyond) on the west coast, they extend typically to about mid-tide level on the east coast. Such contrasts relate primarily to the character of the seaweed vegetation. On the east coast there is a relatively steep gradient of increasing sea temperatures in a northward direction. The character of the seaweed vegetation, however, remains fairly constant but there is constant enrichment of the flora with increase of sea temperature. The study of seaweed vegetation thus leads naturally to a study of distribution patterns of genera and species. The South African Siphonous Chlorophyceae illustrate this study.

Following the classification adopted by G.M. Smith (Cryptogamic Botany, Second Edition) and Egerod (1952), the genera under consideration are classified as follows:-

Siphonales: *Bryopsis, Caulerpa, Codium, Halimeda, Pseudocodium, Udotea.*

Siphonocladales: *Chamaedoris, Microdictyon, Valonia.*

Dasycladales: *Acetabularia.*

The distribution patterns of these genera fall into three main groups.

(1) Distribution over the entire coast of the Union - *Codium, Bryopsis.* Both genera are cosmopolitan.

(2) From the southern end of the Cape Peninsula north-eastwards over the remainder of the Union coasts - *Caulerpa.*

(3) A predominant or exclusive east coast distribution - *Acetabularia, Chamaedoris, Halimeda, Microdictyon, Pseudocodium, Udotea, Valonia.*

The existence of genera confined to warm waters is a characteristic of the South African seaweed flora. The Siphonocladales and Dasycladales are more decidedly warm water plants than the Siphonales. This is confirmed by the common occurence on the coasts of Portuguese East Africa of genera belonging to these two orders which have not been recorded for the Natal coast.

Genera with a relatively wide distribution on South African coasts may be more characteristic of a narrower temperature range than the distribution of the genus might suggest. This is illustrated by an analysis of the distribution of the nine species of *Caulerpa* found on South African shores.

The species fall within three distribution regions:-

(1) The coast eastwards and northwards from the southernmost end of the west coast - *C. bartoneae, C. filiformis, C. holmesiana.* Minimum mean monthly temperature to which these plants are subjected is about 13.5°C. *C. filiformis* often dominates the vegetation at low intertidal levels and in shallow water where the sea is not too rough. It grows on both sandy and rocky substrata.

(2) The east coast of both the Cape Province and Natal - *C. racemosa.* The minimum mean monthly temperature of this region is somewhat under 16.0°C. *C. racemosa* occurs typically on a rocky substratum and where the sea is not too rough it may dominate the lower intertidal level.

(3) Natal coast - *C. ambigua, C. scalpelliformis, C. selago, C. simplex, C. taxifolia,* subjected to a minimum mean monthly temperature of 19.0°C. This is a first record of *C. taxifolia* for the coasts of South Africa. Material of this species was collected by Mr G.M. Thomson at Isipingo near Durban.

In spite of the wide distribution of *Caulerpa* on South African shores, the genus is essentially one of decidedly warm waters. Five out of the nine species are characteristic of Natal coastal waters only, while all nine species occur within this region. Some of these species are rare on Natal coasts.

A third general characteristic of the South African seaweed flora which is illustrated by the Siphonous Chlorophyceae is the increase in the total number of species with an increase in sea temperature. Thus for *Caulerpa* there are three species on the south and east coasts; four species on the southern part of the east coast; and nine species on the Natal coast. While an increase in the number of species in moving northwards on the east coast (i.e., with an increase in sea temperatures) is the case for the seaweed flora as a whole and for the Siphonous Chlorophyceae, it is not true of every constituent genus of the flora. For a few genera such as *Cladophora,* the reverse is true, as more species occur in colder waters.

Lastly, the South African Siphonous Chlorophyceae, like the South African seaweed flora in general, show a high proportion of genera represented by one species. Of the ten genera under consideration, three *(Bryopsis, Caulerpa, Codium)* are represented by several species. *Valonia* has possibly two species but if there is a second species it is rare. *Valonia megalophysa* is common or dominant on vertical rock faces at low intertidal levels where it may be exposed to air for more than an hour at low water of spring tides. Thus at least six out of the ten genera of Siphonous Chlorophyceae are represented by one species.

With the exception of *Pseudocodium,* the genera which have been considered are widely distributed in tropical and sub-tropical seas. This monotypic genus, however, is not endemic and *Pseudocodium de-vriesei* has been found growing abundantly at the southern and of the coast of Portuguese East Africa.

2., The ecology of Siphonales occuring near Perth, Western Australia.

G.G. Smith.

In this region the Siphonales are represented by the genera *Bryopsis, Caulerpa, Codium, Halimeda* and *Penicillus;* the Siphonocladales by *Acetabularia, Polyphysa, Struvea, Dictyosphaeria, Cladophoropsis* and *Microdictyon.* Each genus is represented by a single species except *Caulerpa* with 16 spp., *Codium,* 7, and *Bryopsis,* 2.

Some of these Siphoneae are restricted to the sublittoral, while others extend up into the lower littoral.

While most of the Codiums are deep-water denizens, *C. spongiosum* commonly extends into the sublittoral fringe of the limestone reefs. *Halimeda macroloba* has a similar distribution. *Penicillus nodulosus* is apparently restricted to the lower littoral terraces.

Most of the sixteen Caulerpas are found in mats on the sides of reef dissections in the sublittoral fringe and the shallow sublittoral where encrusting growths of sponges and lithothamnia, together with the porous nature of the limestone, provide a suitable substratum.

Caulerpa cylindracea and *C. sertularioides* on the other hand, are notable for their extensive stands on the flat reef surfaces of the lower littoral, where they are subjected to a fair degree of emersion. These two siphoneae are only succeeded upshore by *Bryopsis sp.*, which is found seasonally in mid-littoral pools.

The species of siphonocladales are relatively minor ones in the reef ecology, with the exception of *Struvea plumosa* which forms extensive palisades of stipes in the turbulent region of the sublittoral fringe. *Acetabularia calyculus, Microdictyon umbilicatum, Dictyosphaeria sericea* and *D. favulosa* are rare species of the littoral. *Cladophoropsis herpestica* occurs in muddy and sandy parts of sheltered reefs, while *Polyphysa cliftoni* is restricted to the sublittoral of muddy estuaries in the Perth region.

Analysis of drift weed suggests that *Codium mamillosum, C. tomentosum* (Harv.), *C. galeatum* and *C. muelleri* are common sublittoral species. *C. laminarioides* is a rare and unusal form from deep water. Caulerpas have been dredged from the shallow sublittoral where they grow on stony substrata and in the extensive *Posidonia* beds, or on firm mud. *Bryopsis sp.* is a common seasonal epiphyte of *Posidonia australis* and *Cladostephus verticillatus*, occuring from the shallow sublittoral down to several fathoms.

The environment of these Siphoneae is a temperate one. Sea temperatures range from a mean of 16.7°C. in June to 22.3°C. in January. The tide is a diurnal one with some semi-diurnal tides at intervals. The siphoneae of the littoral have their emersion considerably reduced by the lagoonal state existing over much of the lower littoral at low tide - a condition brought about by a stony rim about many of the reef edges which, rising up to 18", impounds much of the receding waters of ebb-tide.

The substratum of this rocky shore is late Pleistocene limestone, eroded into reef terraces by marine and biological action. It is very often pitted and pot-holed and in the sublittoral fringe made extremely porous by boring of marine organisms. Considerable dissection of the reef terraces also adds to the wide variety of substrata available to marine organisms and particularly that suitable for the Siphoneae, especially the Caulerpas.

3. Observations on the life-history of *Porphyra capensis*. **J.M. Graves.**

The germination, under sterile culture conditions, of the carpospores of *Porphyra capensis* and the subsequent development of the filamentous phase in the life cycle of this plant were outlined.

In view of the lack of critical evidence as to the exact nature of the reproductive structures found in *Porphyra*, it was emphasized that the terms to describe such structures were used in the paper as a matter of convenience only.

A description was given of the type of development undergone by the filamentous phase on a glass substratum and on an egg-shell substratum. In the latter case penetration of the shell took place. The production of monospores from rows of sporangia formed on the filamentous plants growing in shell, and the subsequent germination of these spores to form young plants of the leafy phase of *Porphyra capensis* were described. There was evidence to suggest that spore production was induced by the drying effect of periodic exposure to the air of the shells containing the filamentous plants.

Remarks by K.M. Drew Baker after Miss J.M. Graves' paper.

The observations reported by Miss Graves appear to provide some much-needed information about one of the unknown parts of the life-history of *Porphyra*. Although Dangeard still questions whether the *Conchocelis*-phase necessarily inhabits shells, the evidence of this phase in the life-history is now well established and it is known from the sea. First Kurogi and now Miss Graves have obtained what each considers leafy thalli, in culture vessels in which the *Conchocelis*-phase had been grown. This I have not succeeded in doing, but on the contrary it has been easy to demonstrate the spread of the *Conchocelis*-phase to sterile shells suspended in culture vessels containing shells 'infected' with *Conchocelis* but not in contact with the latter. Whether the transfer is effected by spores or vegetative filaments is unknown. Moreover, structures referred to as 'plantlets', have developed on several occasions in my cultures, both in interstices in large shells and on the surface of small flakes of shell. Similar 'plantlets' have developed on shells 'infected' with *Conchocelis* and picked up on the Rhosneigr shore, Anglesey. In addition, small 'plantlets' have been found on barnacles collected from the French coast and sent to me by Mr C. van den Hoek. This being so, it appears that these 'plantlets' occur in nature and are not brought about by culture conditions. On the other hand, Miss Graves' observations suggest to me the possibility that conditions of culture may decide whether these 'plantlets' persist and develop vegetatively, or release spores at an early and smaller stage. However, it is necessary to be cautious, as it is not clear whether the spores referred to by Miss Graves are in 'fertile cell-rows' which usually develop inside the shell, or in 'plantlets'. In addition, the relationship of 'fertile cell-rows' and 'plantlets' is far from clear.

4. The generic names *Goniotrichum* Kütz. & *Erythrotrichia* Aresch.

K.M. Drew Baker.

A consideration of the use of these generic names provides a good example of the many confusions to be found in algal nomenclature. During the preparation of the material for the cards of the *Index nominum genericorum* relating to the Bangiophycidae, it was found that the type species of both *Goniotrichum* Kützing, validly published in 1843, and of *Erythrotrichia* validly published by Areschoug in 1850, is *Conferva ceramicola* Lyngbye.

In spite of this, the current concepts of these two genera are such that they are put not only in separate Families but different Orders of the Bangiophycidae. Alike in details of cell structure and that both are epiphytic or epizooic, species of the two genera are easily distinguished by both vegetative characters and methods of reproduction.

An examination of the type specimen of *Conferva ceramicola*, kindly loaned by the Director of the Botanical Museum of the University of Copenhagen, has not only shown that detailed information can be obtained from a minute amount of material but also that if such material had been collected to-day it would be assigned to *Erythrotrichia ceramicola*, as we understand it.

Since *Goniotrichum* Kütz. and *Frythrotrichia* Aresch. are nomenclatural synonyms, this means in effect that species currently referred to *Erythrotrichia* should carry the generic name *Goniotrichum*. At the last International Botanical Congress, and without recognition that *Goniotrichum* is an earlier nomenclature synonym of *Erythrotrichia*, *Erythrotrichia* Areschoug was accepted as a *nomen conservandum propositum*. It was conserved against *Porphyrostromium* Bory (1848) but will be automatically conserved against *Goniotrichum* also. This will obviate the confusion which would have resulted had *Goniotrichum* Kütz. become the name for the taxon usually referred to as *Erythrotrichia* Aresch.

Kützing himself is somewhat responsible for the misuse of the generic name *Goniotrichum* as he considered it possible that Chauvin's *Bangia elegans* and Lyngbye's *Conferva ceramicola* might be identical. *Stylonema* Reinsch (type species *S. cornucervi*) appears to be the earliest validly and effectively published generic name for those algae usually referred to *Goniotrichum* and should be the one adopted.

5. **The autecology of *Halidrys siliquosa* (L.) Lyngb.** **A.J. Lacey & B. Moss.**

On the cost of Northumberland *Halidrys siliquosa* (L.) Lyngb. fruits during the winter months. Germination of the oospores is slow, and no sign of nuclear division is seen until 24-36 hours after mixing of the gametes. Successive divisions follow rapidly and, after 4-6 weeks in culture, an apical tuft of trichothallic hairs is differentiated on each sporeling. The hairs are succeeded by an apical cell developed at the base of a groove. Branching of the sporeling leads to the formation of a definitive axis, which immediately cuts off 'leafy' laterals alternately to the left and to the right. By the end of the first season's growth young plants on the sea shore have only this one kind of lateral differentiated. Air vesicles and later fertile receptacles are formed during the second season's growth.

Two methods were described for the study of periodicity in vegetative growth and reproduction in a plant population. Results obtained from both methods showed that on the Northumberland coast there is a short period in early summer when leafy laterals and then air vesicles are differentiated. This vegetative growth is followed by the development of receptacles from the end of July until the winter. Gametes are not differentiated until early December, and they are shed gradually until the end of March.

A statistical analysis of the variation in width of leafy laterals, air vesicles and receptacles was made on plants collected from different localities along the Northumberland coast. There appears to be a continuous series from broad to narrow forms, indicating that all of them should be retained within the same species.

6. **A preliminary survey of the sublittoral algae of Port Erin Bay, Isle of Man.** **E.M. Burrows.**

In recent years a good deal of information has accumulated concerning the ecology of intertidal algae. There are, however, a number of outstanding problems, not least of which concerns those algae which can only be found on the shore for a limited period of the year. There are obvious interactions between intertidal and sublittoral regions and an understanding of algal ecology for the latter region may help to find a solution to some of these problems.

Present knowledge of the sublittoral region is derived from a study of algae washed on to the shore and from algae taken in dredges: from neither of these sources can the exact position in which they were growing be ascertained. In August 1955, an attempt was made to find the exact distribution of algae in the sublittoral region of Port Erin Bay, Isle of Man. A spring grab, designed at, and kindly loaned by, the Institute of Seaweed Research, Musselburgh, was used as a sampling unit. For each sample, the boat position was fixed by sextant readings on to charted positions on the shore; depths were taken with a line and adjusted to a fixed level against readings on a tide pole on the harbour wall. The efficiency of the grab as a sampling unit was checked by direct observation through the very clear water and also by observations made by an 'aqualung' diver. The grab was found to give a good qualitative sample for all species and a good quantitative sample for the larger brown algae. The water was sufficiently clear for the outline of the major seaweed beds to be plotted by direct observation. Two distinct algal populations were found.

The first was semi-permanent and was attached to the rather narrow rock surfaces fringing the Bay on the north and south sides. It was dominated by *Laminaria digitata, L. saccharina, L. hyperborea* and *Saccorhiza polyschides.* Smaller algae occurred principally as epiphytes on the stipes of *Laminaria hyperborea.*

The sand and gravel of the floor of the Bay was covered by an extensive loose-lying population in which the larger brown algae were *Laminaria saccharina, Saccorhiza polyschides, Chorda filum* and *Desmarestia aculeata.* These were either completely unattached or with the hapteron branches attached to pebbles, pieces of shell or to stones.

For the loose-lying population, of the 56 species so far identified, 15 were also taken from the sublittoral permanent population, 27 were known to occur in the intertidal region, but the following 15 were not found elsewhere in the Bay:-

Desmarestia aculeata, Sphacelaria sp. as an epiphyte on *Desmarestia, Desmarestia ligulata, Arthrocladia villosa, Sporochnus pedunculatus, Isthmoploea sphaerophora, Cutleria multifida, Dictyopteris membranacea, Gracilaria verrucosa, Bonnemaisonia asparagoides, B. hamifera, Trailliella intricata, Brongniartella byssoides, Antithamnion sarniense, Naccaria wigghii.*

Dredging at Easter 1955 failed to collect any algae from the floor of the Bay, suggesting that the loose-lying population had developed since that time. 1955 was a very favourable summer for the development of sublittoral algae in calm clear water under bright sunshine. Reports from the local fishermen suggest that the floor of the Bay is normally clear in the winter, seaweed developing during the summer months and disappearing again sometime in October.

It was quite obvious that any disturbance of the bottom layers of water would dislodge the seaweed. This was observed to happen towards the end of the survey when a strong westerly wind sprang up. Masses of seaweed accumulated on the beach. An analysis of this showed that it came from three sources: the intertidal region, the sublittoral permanent and the sublittoral loose-lying populations. Attempts to replot the major beds by direct observation at this stage failed because sand in the water obscured the view.

The following is a possible sequence of events during the year. In the winter the floor of the Bay is clear of algae. With a rise in temperature and light intensity in the early summer, development is possible in the undisturbed lower layers of water, the plants being either apparently unattached or attached to such holdfasts as are available, sand grains, shells, pebbles and stones. The first winter storms disturbing the lower layers of water either wash the algae inshore or churn them into the sand. Suspended matter in the water will then reduce the light supply and this, coupled with cooling of the water, will make conditions less suitable for algal growth and the population disappears.

At present little can be said concerning the source of the algae for the following season. Certainly some of the species do not reappear. *Acrothrix gracilis* was dredged in quanity in Port Erin Bay a few years ago, but was not found at all on this occasion. Species represented in the intertidal and sublittoral permanent populations could be replenished from these sources. There is little, if any, evidence concerning the way in which algae, occuring only in the loose-lying population, pass the winter months.

Culture techniques are being applied to find an answer to this problem. Samples of the bottom sand and gravel taken at intervals through the winter will be used to try to obtain cultures of the plants belonging to the loose-lying population.

A grant from the Browne Fund of The Royal Society towards the cost of the survey is gratefully acknowledged, as is also the help given to the survey by many persons.

THE SECOND INTERNATIONAL SEAWEED SYMPOSIUM: NORWAY, JULY 1955.

A. The Symposium at Trondheim: July 14th - 17th and the Excursion to the West Coast at Molde: July 18th - 20th.

"We beg to point out that even in summertime the weather on the western coast of Norway may be both windy and cold and we recommend the participants to bring warm clothes." After this kindly warning from the Norwegians, the weather did us proud. and throughout the Second International Seaweed Symposium which was held in Trondheim from July 14th - 17th, 1955, almost tropical sun blazed down upon this northern city. The Symposium, under the chairmanship of Professor Trygve Braarud, was attended by over a hundred chemists, botanists and industrialists from 23 countries, ranging from Europe and North America to South Africa, Australia and Japan. The assembly of experts in various scientific fields, all with seaweed as their raw material. encouraged lively and varied discussions; and everyone enjoyed to the full the varied programme which had been so capably and so carefully arranged by the organising committee.

After the opening address, given by Professor Braarud in the Norwegian Technical University on the morning of July 14th, papers were read and discussed during the following three days, on the chemical composition of seaweeds and methods for their analysis, on the microbiology and on botanical studies of seaweeds of commercial value. Abstracts of these papers were distributed to members attending the Symposium, and each paper will be published in full in the future "Proceedings of the Second International Seaweed Symposium."

On the evening of July 14th we were entertained by the City Council of Trondheim to a soupé in the Britannia Hotel. After many previous discussions as to what was implied by the word "soupé", we arrived to find an excellent dinner served to us in delightful surroundings with fountains and palm trees. After speeches of welcome. to which Dr Woodward responded on behalf of the visitors. we adjourned for coffee and dancing. A farewell dinner was held on Saturday, July 16th, at which thanks were expressed to Professor Braarud and his organising committee.

Sunday, July 17th, was set aside for excursions arranged both for sightseeing around the Trondheim fjord and also for studying the marine flora. The participants divided into three groups; one group visiting the moderately exposed coast of Flakk, another the exposed shores of the island of Munkholmen. and the third. the sheltered shores of Steinviksholm and the adjacent mainland.

During the Symposium in Trondheim we were accomodated in Singsaker student Hostel. This building had been erected during the German occupation, and we all enjoyed its pleasant rooms and facilities and the students' efficient organisation.

From July 18th to 20th. under the leadership of Mr B. Grenager, assisted by Mr A. Korsnes. over sixty of the participants joined in an excursion to Molde and the western coast. The journey to Molde by rail and bus on July 18th took us through magnificient scenery of the mountains to Oppdal and across into the valley of Sunndalen. From Molde, trips were arranged out to the coastal areas where the Norwegian Institute of Seaweed Research carried out its first quantitative surveys of Laminaria in 1951, and the excursion to Bud showed that on these exposed western shores *Porphyra umbilicalis* occurs very high up, and *Fucus inflatus f. disticha* forms an association. On the afternoon we visited Bud, after scrambling over the bleak, exposed stretch of shore we returned to the Prayer-meeting House where the villagers had prepared an array of luscious home made cakes and coffee, interspersed with seaweeds and shells for decoration. We will long remember the hospitality of the inhabitants. who put out the flags to greet our coming!

On the evening of July 20th the excursion in Molde finished. We all left very much impressed by the hospitality of the Norwegian people and extremely grateful for the quiet efficiency of the organisers of the Second International Seaweed Symposium.

B. Moss.

B. An Excursion from Molde to Stalheim: July 20th - 22nd.

One of the most delightful excursions which followed the International Seaweed Symposium took us from Molde to Stalheim, a distance of about 1,000 miles, covered by coach over precipitous zigzag roads and by steamer through majestic fjords, during two and a half long, sunny, Norwegian days. The route led from the Molde fjord with its fine views of the Romsdal Alps, southwards into the Geiranger, Nord and Sogne fjords each separated by high ground and deep snowfields, glaciers and in places, frozen lakes. The fjords varied in width from the broad island-studded Molde fjord to the narrow arm of the great Sogne fjord on which Gudvangen stands. In this latter a deep channel only 200 metres wide is flanked by sheer cliffs the height of Plymlymon, on which nothing but goats seemed able to find a foothold. When the fjord sides sloped more gently, prosperous little farms occupied the banks, their hay corps drying in neat rows on temporary wire fences seven strands high. Sometimes tiny crofts hung precariously among the wooded slopes high above the water, and 'saeter' could be seen where the milk is collected from cattle that have been sent into the high ground to fend for themselves on the transient summer pasture, and so save the better fodder for the winter needs.

The water of the fjords was often green and turbid with the débris carried down from the melting ice, and at low tide a golden band of *Fucus spiralis* and *Ascophyllum nodosum* fringed the water-line, the brilliance of the colour recalling a similar phenomenon that had been so impressive in the Hebrides during the war-time surveys for Chondrus and Gigartina. We reflected on the possible causes of this brilliance which, incidentally had also been apparent in the flower-colour of Phanerogams, both in Norway and the Hebrides. One is led to wonder whether the long day-light over part of the year is a relevant ecological factor.

Another striking feature of the fjords, and particularly of the Geiranger fjord was the tumbling water, cascading down from great heights in broad bands or in small merging cascades, but always enhanced by clouds of spray reminiscent of the billowing tulle of a bridal veil.

Between the fjords, the roads left the flowery meads of the lower valley-sides and zigzagged up through coniferous forests their trees richly bedecked with cones. On the margins numerous phanerogams were in flower and we were especially interested to see *Linnaea borealis*, *Daphne mezereum*, several species of Orchis and Saxifraga as well as great masses of *Silene inflata* which assumed a new and most decorative rôle when growing so profusely.

Higher up the belt of silver birch had a good phanerogamic groundflora and was especially rich in ferns. It gave place on higher ground to a zone of dwarf willows, *Betula nana* and Juniper, among which there was an extremely rich flora; no less than 10 members of the Ericaceae were found, in addition to numerous other plants of great interest. Still higher, the phanerogams ceased and a lichen zone preceded the snow belt where acres of snow were coloured pink by *Haematococcus fluvialis*. We travelled on roads cut through snow drifts, the height of the bus, we saw the incredible blue of the crevasses on a glacier margin and we also had the good fortune to see the sunset turn a glacier to rose-colour with *Haematococcus* adding to the kaleidoscope on the nearer ground. In places frozen lakes were seen sometimes with pale blue pools, thawing at their margins, and then, when lower ground was finally reached again, the fresh water lakes were only distinguishable from the fjords by the fact that a border of *Scirpus palustris* replaced the Fuci.

Our journey as a party ended on the heights of Stalheim about Gudvangen where we were rewarded in the early morning by a superb view of the deep valley, lighted laterally by the rising sun with the bright green leaves of opening Horse Chestnut buds in the foreground. This delayed spring was a fitting reminder of the immense height of the great clefts which titanic forces had rent in the earths crust possibly at the time of the Armorican folding, subsequently to be carved and worn by wind and water and ice, and to bear the rich vegetation which we associate with the Norwegian fjord country.

L. Newton.

LIST OF MARINE ALGAE COLLECTED AT ST BEES HEAD, CUMBERLAND, BY MEMBERS OF THE PHYCOLOGICAL SOCIETY, 12th September, 1955.

Introduction: As part of the programme of the Field Meeting held at Ferry House Ambleside, about 35 members of the Society took part in an excursion to the shore at St Bees Head, Cumberland, on 12th September 1955. Dr H. Blackler and Dr J. W. G. Lund had made a preliminary inspection of this shore earlier in the year (4th April 1955).

Hardly any records of marine algae are known to exist for the coast of Cumberland and it was decided to make a collection as comprehensive as possible in the short time available (about 2½ hours were spent on the shore) to provide further information on the distribution of British algae for incorporation in the proposed new Flora. The collecting was carried out mainly by four groups of members each with one or two leaders, and each mainly responsible for collecting algae of one particular class; other members collected independently. The collections were combined and partly identified on return to Ferry House and algal record cards completed for as many species as possible; all critical material was taken away by the leaders of groups for further study. Copies of all completed algal record cards have since been sent to Plymouth.

Subsequently the leaders each compiled a list of the algae found (with notes) and are responsible for the identifications (unless otherwise stated in the text) as follows:

Chlorophyta : E. M. Burrows and P. S. Dixon.
Phaeophyta : H. Blackler
Rhodophyta : K. M. Drew Baker.
Cyanophyta : H. T. Powell and H. G. Kerr.

The over-all list has been standardized and the present report compiled by H. T. Powell.

The terms 'supralittoral fringe' and 'mid-littoral zone' are used in the sense of T. A. & A. Stephenson (1949); see also Lewis (1955) for further discussion of the application of these terms to British coasts. In the present instance, the upper limit of *Balanus balanoides* in quantity is used as the dividing line between these two zones, so that most of the *Fucus spiralis* and *Chthamalus stellatus* belts are included in the supralittoral fringe.

General description of the area: The shore at St Bees Head is composed of gently sloping ledges, reefs and boulders of New Red Sandstone (Triassic: mainly conglomerate, sandstone and marl). The approach to the headland, from St Bees to the south, is by way of a sandy beach. Most of the collecting was carried out on the rocky shore immediately north of the beach for some distance up towards St Bees Head proper; however one small party collected algae on reefs at the south end of St Bees beach (referred to as the "southern reefs" in the algal list below). The tidal ranges quoted for nearby Whitehaven in the Admiralty Tide Tables are: Spring tides 23.6 ft. and Neap tides 12.8 ft. Both in April and September the shore was visited at low water of a neap tide and the *Laminaria digitata* belt was only very slightly uncovered.

The whole of this coast is fairly exposed, as is indicated by the dominant species present; thus the exposed faces of ledges and boulders, in the mid-littoral zone especially, were densely covered with several species of barnacles and had very little algal cover at all. Three species of barnacles were noted:- (i) *Chthamalus stellatus* dominant on the upper third of the shore (including the supralittoral fringe), (ii) *Balanus balanoides* dominant in the mid-littoral zone, with (iii) *Elminius modestus* Darwin (an Australasian barnacle first discovered in Britain in 1945) frequent among *Balanus balanoides* from about M.T.L. down to low water level.

The most sheltered part of the shore is the upper part of the first outcrop of rock to the north of the sandy beach and it was only here that *Pelvetia canaliculata* was found (on the lee sides of some of the upper ledges). *Ascophyllum nodosum* was also present on mid-littoral boulders in this area; elsewhere it occurred only in locally sheltered positions, mixed with *Fucus spiralis*, *F. vesiculosus* and *F. serratus*. *F. spiralis* occupied its usual position on the upper shore and the plants on open faces were often stunted. *F. vesiculosus* was common in locally sheltered positions throughout the mid-littoral and the plants had a good number of vesicles (indicating only moderately severe wave-action). *F. serratus* occurred commonly throughout the lower half of the mid-littoral, especially in gullies and crevices.

Good colonies of the tube-worm *Sabellaria alveolata* were noted among boulders near L.W., and the dog-whelk *Nucella lapillus* was abundant on barnacle-covered rocks and boulders on the lower half of the shore; an unusually large proportion of the *Nucella* population had yellow or orange coloured shells.

The supralittoral fringe zone was dominated by *Chthamalus stellatus*, with *Littorina rudis* also very common especially in crevices. *Fucus spiralis* was co-dominant with *Chthamalus* in the lower part of the zone and *Pelvetia* was scarce. A weft of blue-green algae with *Calothrix scopulorum* usually dominant, was present on all suitable rock surfaces, being best developed on rather damp surfaces just above *Pelvetia/Fucus spiralis*. Patches of *Blidingia minima* occurred frequently among the *Cyanophyta*.

Systematic List: There follows a systematic list of all the algae identified. Except for a few cases, the order of listing the species and the nomenclature used are similar to the order and nomenclature used by Parke (1953).

CHLOROPHYTA

Chlorochytrium cohnii Wright. In the thallus of *Blidingia minima*.

Monostroma grevillei (Thur.) Wittr. Attached to barnacles and mussels in the lower mid-littoral region.

Blidingia minima (Näg.) Kylin. Frequent; on gently sloping ledges in the lower part of the supralittoral fringe.

Enteromorpha intestinalis (L.) Link. Rather widely distributed around freshwater drainage channels.

Enteromorpha sp. Occuring in a small rock pool in the mid-littoral region, with *Ulva lactuca.* (The specimens range in appearance from *E. intestinalis* to *E. linza* (L.) J. Ag. but in cell arrangement they are unlike any *Enteromorpha sp.* figured; the arrangement is more like that of *Prasiola stipitata* Suhr.).

Ulva lactuca L. Widely distributed: attached to barnacles and mussels and in pools in the mid-littoral region.

Entocladia perforans (Huber) Levring. Occasional, among mixed Cyanophyta, in most samples of the latter taken from the upper half of the supralittoral fringe. (Collected and identified by H. G. Kerr).

Cladophora rupestris (L.) Kützt On the rock surface and in pools in the mid-littoral region.

Cladophora sp. Frequent in a small pool in middle part of supralittoral fringe. (Collected, and tentatively identified as *C. sericea* (Huds.) Kütz., by H. T. Powell; material bears frequent epiphytic Cyanophyta (q. v.)).

Rhizoclonium riparium (Roth) Harv. Very common. Growing entangled with *Catenella repens* and an *Enteromorpha sp.*, in the *Fucus spiralis* zone.

Urospora penicilliformis (Roth) Aresch. Occasional in the supralittoral fringe.

(N. B. In the present state of our knowledge, many of the Chlorophyta forwarded to us cannot be identified with any degree of certainty and we have therefore omitted them from this list. E. M. B., P. S. D.)

PHAEOPHYTA

Acinetospora crinita (Carm.) Kornmann. Unilocular and plurilocular sporangia on the same plants, April and Sept.

Ectocarpus confervoides (Roth) *Le Jol.* On *Laminaria digitata* in pools, at about M. L. W. N.; St Bees Head and southern reefs. With plurilocular sporangia.

Ectocarpus fasciculatus Harv. Rare: epiphytic on frond of *Laminaria digitata* in a pool at about M. L. W. N. Minute tufts up to 5 mm. high, with plurilocular sporangia.

Giffordia granulosa (Sm.) Hamel. Epiphytic on frond of *Laminaria digitata* in a pool at about M. L. W. N. With plurilocular sporangia.

Pylaiella littoralis (L.) Kjellm. Very common: on open rock, in pools and epiphytic on *Fucus vesiculosus*, *F. serratus*, *Laminaria digitata* and *Corallina officinalis*, from above M. T. L. to about M. L. W. N. April and September St Bees Head and southern reefs. Unilocular and plurilocular sporangia on the same plants.

Waerniella lucifuga (Kuck.) Kylin. Rare. Two finds only, on the shaded sides of two crevices about 18 in. (vertically) above the upper limit of *Fucus spiralis.* With a few empty plurilocular sporangia in September. (Collected and identified by H. G. Kerr).

Ralfsia verrucosa (Aresch.) J. Ag. Forming extensive coriaceous crusts in lower part of supralittoral fringe, on rocks otherwise bare of algae, near the cave at St Bees Head.

Elachista fucicola (Vell.) Aresch. f. *fucicola*. Abundant: epiphytic on *Fucus vesiculosus* and *F. serratus* from above M. T. L. to about M. L. W. N. St Bees Head and southern reefs. Some plants were in the winter condition with few remaining erect filaments, or with only the globular basal part of the plant left, and with unilocular sporangia.

Elachista scutulata (Sm.) Duby. On cast-up *Himanthalia elongata;* St Bees Head and southern reefs. With abundant plurilocular sporangia.

Desmarestia aculeata (L.) Lamour. Many plants (winter form) found cast-up in April.

Chorda filum (L.) Stackh. A few pieces found cast-up; St Bees Head and southern reefs. With unilocular sporangia.

Laminaria digitata (Huds.) Lamour. In pools, at about M.L.W.N.

Laminaria saccharina (L.) Lamour. Found on south side of St Bees Head and on southern reefs, at about M.L.W.N.

Sphacelaria cirrhosa (Roth) Ag. A few plants found in a pool in the *Fucus spiralis* zone. Unattached propagules present, developing into new plants. (Identified by D.E.G. Irvine).

Cladostephus spongiosus (Huds.) Ag. Scarce; on rocks covered with sand and silt near M.L.W.N. at St Bees Head, April and September; also on southern reefs in September.

Ascophyllum nodosum (L.) Le Jol., f. *nodosum.* On boulders and rocks from about M.H.W.N. downwards almost to M.L.W.N. Best developed on boulders at the northern side of the sandy beach (south of St Bees Head), but was found also in locally sheltered positions on other parts of the shore; often mixed with *Fucus spiralis, F. vesiculosus* and *F. serratus.*

Fucus ceranoides L. A few small pieces found cast-up; ripe oogonia in one piece.

Fucus serratus L. Common on rocks and boulders on the lower shore, and up to about M.T.L.; mixed with *F. vesiculosus* in upper part of range. St Bees Head and southern reefs. Many plants very battered. Fertile.

Fucus spiralis L. Common on the upper shore (lowest part of supralittoral fringe). Plants at top of zone very small and battered, rusty red and twisted. End of fruiting season; many plants with spent receptacles.

Fucus vesiculosus L. Common throughout the mid-littoral zone; St Bees Head and southern reefs. The plants had many vesicles.

Pelvetia canaliculata (L.) Dcne. et Thur. Only found on high-level rocks at the north end of the sandy beach, which is the part of this shore most sheltered from direct wave-action.

Himanthalia elongata (L.) S. F. Gray. Cast-up; south end of St Bees headland and southern reefs, Plants up to one metre in length, found liberating oogonia.

RHODOPHYTA

Erythrotrichia ceramicola (Lyngb.) Aresch. Rare; on *Laurencia pinnatifida.*

Porphyra laciniata (Lightf.) Ag. Abundant (less at exposed places); from above M.T.L. to about M.L.W.N., on boulders, rocks, limpets and barnacles. Some in pool near high water level. St Bees Head and southern reefs.

Porphyra sp. Occasional; on *Fucus serratus.*

Conchocelis - phase of either *Porphyra sp.* or *Bangia.* Occasional, in shells of winkle, barnacle and oyster; few fertile cell-rows present.

Rhodochorton daviesii (Dillw.) Drew. Occasional, on *Ceramium rubrum* in a pool in *Fucus spiralis* zone; with monosporangia.

Rhodochorton floridulum (Dillw.) Nag. Locally abundant throughout mid-littoral zone; on sand-covered rocks and boulders. St Bees Head and southern reefs.

Rhodochorton purpureum (Lightf.) Rosenv. One colony only seen; young. In small crack in cliff with *Cochlearia officinalis* and *Plantago maritima.*

Rhodochorton rothii (Turt.) Näg. Abundant in mid-littoral zone; on rocks and both tops and sides of boulders, both under Fucoids and fully exposed; plants young.

Rhodochorton secundatum (Lyngb.) comb. nov. Fairly frequent epiphyte on *Laurencia pinnatifida;* with monosporangia.

Catenella repens (Lightf.) Batt. Locally abundant; from M.T.L. to just above the *Fucus spiralis* zone; forming close extensive 'mats' either (i) fully exposed on the shaded sides of rocks and boulders, or (ii) in small crevices, or (iii) in shelter under *F. spiralis* and *Ascophyllum nodosum.*

Cystoclonium purpureum (Huds.) Batt. Rare; cast-up; carposporophytes.

Plocamium coccineum (Huds.) Lyngb. Occasional; one plant attached in pool in *Fucus spiralis* zone, the rest cast-up; sterile. St Bees Head and southern reefs.

Gracilaria verrucosa (Huds.) Papenf. Common to locally abundant; carposporophytes. St Bees Head and southern reefs.

Ahnfeltia plicata (Huds.) Fries. Rare; sterile. St Bees Head and southern reefs.

Chondrus crispus (L.) Stackh. Occasional; on rocks and boulders in the mid-littoral zone and in pools at the top of this zone; also short isolated tufts in shallow mid-littoral pools; tetrasporangia on few thalli. St Bees Head and southern reefs.

Gigartina stellata (Stackh.) Batt. Rare to occasional; on rocks and boulders in lower half of mid-littoral zone; carposporophytes on plants in damp channels and on more exposed rocks. St Bees Head and southern reefs.

Polyides caprinus (Gunn.) Papenf. Rare. Found on southern reefs.

Hildenbrandia prototypus Nardo. Found on southern reefs.

Hildenbrandia sp. Abundant; under water in a cave in cliff, but cave well above M.H.W.S. so presumably species is not marine.

Corallina officinalis L. Locally abundant; in pools in *Fucus spiralis* zone and below; conceptacles present but those examined were empty. St Bees Head and southern reefs.

Lithophyllum incrustans Phil. Lining a small pool in the upper part of the mid-littoral zone. (Found and identified by H.T. Powell).

Lithothamnion lenormandii (Aresch.) Fosl. Rare; on stones; conceptacles present, but contents not determined.

Lithothamnion polymorphum (L.) Aresch. Rare to occasional; on barnacles; conceptacles present, but contents not determined.

Rhodymenia palmata (L.) Grev. Locally abundant; attached to *Fucus serratus* and boulders throughout the lower half of the mid-littoral zone also cast-up; forming carpets on flat rocks and boulders on the most exposed part of the headland.

Callithamnion hookeri (Dillw.) Ag. Rare to occasional; epiphytic on *Enteromorpha, Ceramium* and *Polysiphonia;* mostly on lee sides of large boulders at exposed places, also one plant in pool in mid-littoral zone; tetrasporangia present although the plants were small.

Ceramium acanthonotum Carm. ex. Harv. Rare on shore as a whole but abundant where it was found; with mussels and *Ceramium rubrum* on lee sides of upper parts of boulders in exposed positions; with tetrasporangia. (Identified by E. Conway). Also recorded in April by H. Blackler.

Ceramium flabelligerum J. Ag. Occasional to locally abundant; with tetrasporangia.

Ceramium rubrum (Huds.) Ag. Abundant; on boulders and in pools throughout the mid-littoral zone; epiphytic on *Gigartina stellata;* in a pool in *Fucus spiralis* zone; also cast-up. Carposporophytes; tetrasporangia. Plants at L.W. parasitized by a fungus.. St Bees Head, April and September; southern reefs.

Ceramium strictum Harv. Occasional; on lee sides of boulders and rocks in the *Fucus serratus* zone; with tetrasporangia. St Bees Head and southern reefs.

Griffithsia flosculosa (Ellis) Batt. Rare; one plant found on southern reefs.

Spermothamnion repens (Dillw.) Rosenv. One specimen found on a boulder at about M.L.W.N.; with tetrasporangia.

Delesseria sanguinea (Huds.) Lamour. Occasional; cast-up; sterile. St Bees Head and southern reefs.

Hypoglossum woodwardii Kutz. One attached plant found on southern reefs; sterile.

Phycodrys rubens (Huds.) Batt. Occasional; cast-up.

Laurencia pinnatifida (Huds.) Lamour. Locally frequent on rocks and boulders in the lower half of the mid-littoral zone; thalli all young and sterile. St Bees Head and southern reefs. (Identified by H.T. Powell).

Polysiphonia elongata (Huds.) Harv. Only two specimens found, both in high-level pools, one in *Fucus spiralis* zone and the other in the upper mid-littoral zone

Polysiphonia lanosa (L.) Tandy. Locally abundant on *Ascophyllum nodosum;* also cast-up on a piece of *Ascophyllum.*

Polysiphonia nigrescens (Sm.) Grev. Locally frequent on sand-covered boulders at about M.L.W.N.; also some in a pool in *Fucus spiralis* zone. St Bees Head and southern reefs.

Polysiphonia urceolata (Dillw.) Grev. Occasional on sand-covered rocks in lower mid-littoral zone. St Bees Head, April and September; southern reefs.

Rhodomela confervoides (Huds.) Silva. In pools near low water in April: one plant found in September.

CYANOPHYTA

Gloeocapsa crepidinum Thur. (probably to be included in the genus *Anacystis* Menegh. emend. Dr et Daily; see Park, 1953. (Possibly *A. aeruginosa* (Zanard.) Dr et Daily, 1952?)). Supralittoral fringe; frequent; with *Calothrix scopulorum* on open surfaces, and on *Rivularia atra.*

Dermocarpa prasina (Reinsch) Born. et Thur. (probably to be included in the genus *Entophysalis* Kützo emend. Dr et Daily; see Parke. 1953. (Possibly *E. conferta* (Kütz.) Dr et Daily, 1952?)). Frequent epiphyte on *Enteromorpha sp.* (itself entangled with *Catenella repens,* etc.), on the lee faces of ledges in the *Fucus spiralis* and upper *Ascophyllum* zones.

Pleurocapsa crepidinum Collins. (probably to be included in the genus *Entophysalis* Kütz. emend. Dr et Daily; see Parke, 1953. (Possibly *E. conferta* (Kütz.) Dr et Daily, 1952?)). Occasional in lowest part of *Calothrix scopulorum* community, at about the top of *Fucus spiralis* zone.

Pleurocapsa kerneri (Hansg.) Dr. (probably to be included in the revised taxon *Entophysalis crustacea* (J. Ag.) Dr. et Daily, 1952). Supralittoral fringe; occasional in upper part of *Calothrix scopulorum* community; also abundant and extensive epiphytic colonies on the basal parts of *Cladophora (sericea?)* and *Enteromorpha sp.* in a supralittoral pool. Cells mostly 4-6.5μ (occasionally 7-8μ) x 4-5μ.

Xenococcus schousboei Thur. (probably to be included in the revised taxon *Entophysalis conferta* (Kütz.) Dr. et Daily, 1952). Lower part of supralittoral fringe; occasional epiphyte on *Calothrix scopulorum*; also occasional on *C. crustacea* and frequent on rock surface in a small pool. Most cells 6-9μ diameter, but a few cells up to 14μ diam.

Calothrix crustacea Thur. ex. B. et F. The dominant blue-green in small pools in the lower part of the supralittoral fringe; with hormogones.

Calothrix scopulorum (Web. et Mohr) Ag. ex B. et F. Abundant. The dominant species in the supralittoral fringe community of blue-green algae especially on exposed surfaces; less frequent on shaded surfaces. With hormogones and exospores.

Rivularia atra Roth ex B. et F. Frequent in lower half of supralittoral fringe; especially around margins of pools and in damp depressions, but also forming confluent sheets on shaded sides of vertical rock (with *Microcoleus tenerrimus*, etc.).

Rivularia australis Harv. ex B. et F. Top part of supralittoral fringe; locally frequent at sides of freshwater runnels on vertical rock (base of cliff); with *Enteromorpha intestinalis*. The only other British record of this species appears to be that of Batters (1902 List) for Torquay.

Plectonema battersii Gom. Occasional in supralittoral fringe, with *Calothrix scopulorum* or on *Rivularia atra*, especially in damp depressions.

Lyngbya epiphytica Hieron. Very rare epiphyte on *Lyngbya meneghiniana* (itself epiphytic on *Cladophora (sericea?)*) in a pool in middle part of supralittoral fringe. Filaments twined around the host in a very characteristic loose spiral; trichomes c. 1.0μ broad and cells up to 1.5μ long; the cells are constricted at the septa in this material. This appears to be a new record for Britain, at least for a marine habitat.

Lyngbya infixa Frémy. Fairly frequent epiphyte on *Enteromorpha sp.* and *Cladophora (sericea?)* in a pool in middle part of supralittoral fringe. Trichomes c. 1.7μ broad, cells as long as broad. This is a new record for Britain, although the species is probably common in Britain.

Lyngbya meneghiniana (Kütz.) Gom. ex Gom. Frequent epiphyte on *Cladophora (sericea?)* in a pool in middle part of supralittoral fringe. Filaments of both *Lyngbya meneghiniana* and *L. infixa* were frequently covered with short bacterial (?) threads c. 0.02μ broad.

Lyngbya rivulariarum Gom. Occasional filaments found within most colonies of *Rivularia atra* (q.v.) examined. Trichomes 0.7-1.0μ broad and cells 1.1μ - 3.2μ long, slightly constricted at the septa.

Microcoleus chthonoplastes Thur. ex Gom. Occasional (with *Microcoleus tenerrimus*, etc.) on shaded vertical rock, above a small pool, in the upper part of the supralittoral fringe.

Microcoleus tenerrimus Gom. Locally frequent in lower half of supralittoral fringe; usually on moist and sheltered rock, with other Cyanophyta. Co-dominant with *Rivularia atra* on one shaded vertical rock.

Oscillatoria tenuis Ag. ex Gom. Rare; supralittoral fringe, just above uppermost *Fucus spiralis*. Found growing with *Rivularia atra* on shaded vertical rock.

Phormidium fragile Gom. Very frequent throughout the supralittoral fringe 'blue-green' zone; on both sheltered and exposed rock surfaces, also found within colonies of *Rivularia atra*.

Phormidium molle Gom. Locally frequent on damp, sheltered, rock surfaces, in lower half of supralittoral fringe, with other Cyanophyta. Trichomes broader than type, up to 4μ ; constricted at septa; sheaths very prominent. Recorded by Anand (1937) but not listed by Parke (1953).

Phormidium tenue Gom. Occasional, with *Calothrix crustacea* etc., at edge of a pool; middle part of supralittoral fringe.

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H.T. POWELL.

SOME NOTES ON MARINE ALGAE OF THE KENYA COAST

The long vacation at Makerere College, Uganda, gave me an opportunity to explore some more distant parts of Tanganyika, Zanzibar and Kenya and my safari ended with a week at Malindi, 80 miles North of Mombasa, collecting seaweeds. Very few of our Makerere students have ever seen the sea which is 800 miles away and lectures on marine algae seem a little remote from reality. In any case, I wanted to dispel from my mind the inevitable English background of Fucales.

Malindi is a small resort situated opposite a break in the otherwise almost continuous coral reef which lies off this part of the coast. At low water spring tides large areas of this reef are exposed; but unfortunately my visit coincided with neap tides and so collecting was largely confined to the area of coral surface between high and low water marks of neap tides. Through the kindness of the Chief Fisheries Officer, who also provided laboratory facilities, I was able to make one journey to the outer reef where his assistant, an experienced goggler, dived and collected weeds from the vertical rock face.

The surface of the shore in the inter-tidal zone is flat except for a few pools not more than a foot in depth. The coral rock slopes gently and is in places covered with sand. The grass-like *Diplanthera uninervis* (Forssk.) Aschers (Zannichelliaceae) is frequent, especially where its rhizomes can creep in the sand, and the marine phanerogam *Cymadocea ciliata* (Forssk.)

Ehrenb. ex Aschers. (Zannichelliaceae) lines the shallow pools and is washed up in quantities on the beach. Indeed these phanerogams replace the Fucales of the higher zones on an English rocky shore.

Of the Chlorophyceae, *Ulva lactuca* L. and *Ulva reticulata* Forssk. were common together with a species of *Chaetomorpha* and *Struvea anastomosans* (Harv.) Piccone. The latter is used by the local fishermen as a fish bait. The swollen vesicles of *Boergesenia forbesii* (Harv.) Feldm. were a constant feature of the pool edges and in a few places *Caulerpa sertularioides* (Gmel.) Howe was creeping in the sand. *Halimeda opuntia* Lamour., both the form *typica* and the form *triloba*, as well as *Halimeda tuna* (Ellis & Soland.) Lamour. occurred in the pools. *Codium* was not seen growing though plenty was washed up on the shore.

Perhaps the most noticeable feature of the coral marine vegetation to an English botanist is the absence of the brown algae so characteristic of cooler seas. Odd plants of *Sargassum* sp. were washed up and *Turbinaria conoides* (J. Ag.) Ktz., *Padina gymnospora* (Ktz.) Vickers and *Dictyota* sp. were common in the pools. *Colpomenia sinuosa* (Roth) Derb. et Sol. occurred more often towards low tide level while *Cystoseira myrica* (Gmel.) J. Ag. was a common feature of the pools at all levels.

The Rhodophyceae are usually found in deeper water and there must have been many more than I was able to collect. Two species, *Gracilaria radicans* Hauck, mainly in the upper zone and *Laurencia papillosa* (Forssk.) Grev. rather lower down were common round the edges of the shallow rock pools (the latter being very reminiscent of the shores of Port St. Mary, Isle of Man). *Corallina* sp. occurred in the pools on the rocks and attached to the stalks of *Cymadocea*; *C. plumifera* Ktz. being particularly common in the latter situation. Other common Rhodophyceae were *Galaxaura robusta* Kjellm., *Amphiroa anceps* (Lamk.) Decne., *Hypnea pannosa* J. Ag. and other *Hypnea* sp. Among the deep water species washed up on the shore were *Chondrococcus hornemannii* (Mert.) Schmitz.; *Halymenia venusta* Boergs.; *H. polydactyla* Boergs.; *Chrysymenia uvaria* (L.) J. Ag.; *Coelarthrum opuntia* (J. Ag.) Boergs.; *Gracilaria sp. cervicornis* (Turn.) J. Ag.; and *G. corticata* J. Ag.

One expedition was made to the coral reef by boat. The reef was covered even at low tide and we were unable to land. But the Assistant Fisheries Officer kindly dived into the deep water off the reef and being an expert underwater swimmer collected from a depth of about 8 ft. Apart from *Corallina* and a few small species on the stalks no Rhodophyceae were found; but *Ulva* and *Padina* were present in quantity.

I would like to acknowledge my indebtedness to Miss C. I. Dickinson, of the Royal Botanic Garden, Kew for her help in naming many of the species of algae collected at Malindi.

E. M. LIND.

University College,
Makerere
E. Africa

A PRELIMINARY CHECK-LIST OF BRITISH MARINE ALGAE

Corrections and Additions 1953 - 1955

Since the Check-List was compiled in 1953 (J. Mar. biol. Assoc. U.K., 32, 497-520) new British records have been published and a number of phycologists have, as requested, sent in corrections and additional unpublished records. The corrections and new records are given below in the order of the 1953 Check-List, the page numbers given referring to the pages of the Check-List.

p. 498. Genus *Brachiomonas*: (1) after "*submarina* Bohlin" add "emend. Droop" (1953)
(2) below "*submarina*" add "var. *submarina*" & "var. *pulsifera* Droop" (1955)
(3) delete "? *vestiana* Pascher".

Genus *Chlamydomonas*: add below "*microplankton* Rke." species "*pulsatilla* Wollenw." (Droop, 1955).

Genus *Chlorella*: from Dr J. W. G. Lund - *C. salina* Butcher (1952) antedated by *C. salina* Kufferath (1918) 1919. Dr Butcher is dealing with this point.

Genus *Nannochloris*: add below "*maculatus* Butcher" new species "*oculata* Droop" (1955).

Genus *Enteromorpha*: add below "*compressa* (L.) Grev." new species "*intermedia* Bliding" (1955).

Genus *Ulva*: See Føyn, 1955.

p. 499. Genus *Protoderma*: (1) replace genus name "*Protoderma*" by "*Pseudendoclonium* Wille, 1901" (2) replace species name by "*marinum* (Rke.) Aleem et Schulz" (1952).

p. 500. Genus *Rhizoclonium*: species list emended - see Koster, 1955; complete list of species should now read:-

arenosum (Carm.) Kütz.
? *hieroglyphicum* (Ag.) Kütz.
implexum (Dillw.) Kütz.
  (= *kerneri* Stockm. & *kochianum* Kütz.)
riparium (Roth) Harv.
  f. *riparium*
  f. *validum* Foslie
    (= *R. tortuosum* (Dillw.) Kütz.)

Family Caulerpaceae: from Prof. G. F. Papenfuss - replace "Caulerpaceae" by "Bryopsidaceae".

Genus *Codium*: species list emended - see Silva, 1955; complete list of species should now read:-

adhaerens (Cabr.) Ag.
? *amphibium* Moore
bursa (L.) Ag.
fragile (Sur.) Hariot
  subsp. *atlanticum* (Cotton) Silva
    (= *tomentosum* var. *atlanticum* (Cotton) L. Newton)
  subsp. *tomentosoides* (van Goor) Silva
tomentosum Stackh.
vermilara (Olivi) Delle Chiaje

Family Phyllosiphonaceae: from Prof. G. F. Papenfuss - Mangenot (1948) produced evidence for the removal of *Phyllosiphon* from the Chlorophyceae to the Xanthophyceae. Papenfuss (1955) has placed this family in the order Vaucheriales in the class Xanthophyceae.

p. 501. Add following Class before Xanthophyceae:-

Euglenophyceae (see Pringsheim, 1953)
Euglenales
  Euglenaceae
    Euglena Ehrenberg, 1838.
      deses Ehr.
        var. *carterae* Pringsh.
      proxima Dangeard
        var. *anglesia* Pringsh.
        var. *dangeardii* Pringsh.

viridis Ehr.
var. *halophila* Pringsh.
var. *maritima* Pringsh.
Eutreptia Perty, 1852.
pertyi Pringsh.
viridis Perty.

p. 501. Order Heterosiphonales: from Prof. G.F. Papenfus & Dr P.C. Silva - replace "Heterosiphonales" (Pascher, 1912) by "Vaucheriales" (Bohlin, 1901).

p. 502. Class Chrysophyceae: add the following Order before the Order Chrysomonadales:-
Stichogloeales (see Bourrelly, 1954)
Stichogloeaceae
Phaeodactylum Bohlin, 1897.
tricornutum Bohlin
See Wilson (1946, as *Nitzschia closterium* W. Sm. forma *minutissima* of Allen and Nelson) Hendey (1954). Bourrelly and Dragesco (1955).

Family Chromulinaceae: (1) from Prof. G.F. Papenfuss - replace "Chromulinaceae" (Engler, 1897) by "Chrysomonadaceae" (Stein orth. mut. De Toni, 1895) (2) Add below genus *Chromulina* the following genus and species:-
Monochrysis Skuja, 1948
lutheri Droop (1953, 1955)
Dr P. Bourrelly (personal communication) is of the opinion that *Monochrysis* Skuja, 1948, is synonymous with *Phaeaster* Scherffel, 1927. (3) Add after family Chrysomonadaceae the following family with genera and species:-
Mallomonadaceae
Mallomonas Perty, 1852.
epithalattia Droop (1955)
Microglena Ehrenberg, 1838.
arenicola Droop (1955).

Family Cyrtophoraceae: from Prof. G.F. Papenfuss - replace "Cyrtophoraceae" (Pascher, 1911) by "Pedinellaceae" (Pascher, 1910).

Family Isochrysidaceae: add after *Isochrysis* the following genus and species:-
Pleurochrysis Pringsheim, 1955
scherffelii Pringsheim (1955).
Systematic position uncertain - placed provisionally in the Isochrysidaceae.

Family Ochromonadaceae: (1) See Papenfus (1955) - replace "Ochromonadaceae" (Senn, 1900) by "Monadaceae" (Stein orth. mut. Engler, 1898) (2) new records from Dr M R Droop - add the following two genera and species before the genus *Ochromonas*:-
Heterochromonas Pascher, 1912
globosa Skuja
Nephromonas Droop, 1953 (placed here provisionally)
hyalina Droop

Family Prymnesiaceae: see Parke, Manton & Clarke (1955, 1956) - add before the genus *Prymnesium* the following genus and species:-
Chrysochromulina Lackey, 1939
alifera Parke & Manton (1956)
brevifilum Parke & Manton (1955)
ephippium Parke & Manton (1956)
ericina Parke & Manton (1956)
kappa Parke & Manton (1955)
minor Parke & Manton (1955)

Order Rhizochrysidales: delete, to leave Platychrysidaceae provisionally as a family in the order Chrysomonadales.

Genus *Phaeocystis*: See Kornmann, 1955.

p. 503. Genus *Giffordia*: Name change - replace "*ovata* (Kjellm.) Kylin" by "*fuscata* (Zan.) Kuck." (Kornmann, 1954).

Genus *Herponema*: from Prof. G. F. Papenfuss - Lindauer's concept of *Herponema* is rather different from that of Hamel - see Lindauer, 1949.

p. 504. Family Leathesiaceae: from Prof. G. F. Papenfus - replace "Leathesiaceae" (Setchell and Gardner, 1925) by "Corynophlaeaceae" (Oltmanns, 1922).

Family Mesogloiaceae: see Papenfuss 1955 - replace "Mesogloiaceae" (Kützing, 1843) by "Chordariaceae" [(C. Agardh.) Greville orth. mut. Harvey, 1849].

Genus *Mesogloia*: from Dr P. C. Silva - replace "*vermiculata* (Sm.) Le Jol." by "*vermiculata* (Sm.) S. F. Gray".

Family Acrothricaceae: from Dr O. Sundene - should read "Acrotrichaceae".

p. 506. Genus *Halopteris*: from Dr M. A. P. Madge - add name "(*Stypocaulon scoparium*)" from Newton (1931) below "*scoparia* (L.) Sauv."

Family Dictyotaceae: for genus name "*ilophus*" read "*Dilophus*".

Genus *Cystoseira*: from Dr P. C. Silva & Prof. G. F. Papenfuss reduce "(*C. fibrosa* (Huds.) Ag.)" to synonym for "*baccata* (Gmel.) Silva" (1952).

p. 508. Subclass Bangiophycidae: add before Order Goniotrichales the following:-

Porphyridiales (see J. Feldmann, 1955)
Porphyridiaceae
Porphyridium Nägeli, 1849
cruentum (Ag.) Näg.

[Cultured by Miss E. Clay from seawater sample from Brixham Harbour, April 1953. Prof. E. G. Pringsheim confirmed Dr M. R. Droop's & Mr H. Powell's identifications of this species. *P. marinum* Kylin is probably not a distinct species].

Family Goniotrichaceae: add the following genus and species after *Asterocytis*:-

Colacodictyon J. Feldmann, 1955
reticulatum (Batt.) J. Feldm.
(*Colaconema* (?) *reticulatum* Batt.)

Genus *Erythrotrichia*: replace "*ciliaris* (Carm.) Batt." by "*ciliaris* (Carm.) Thur." - see Papenfuss, 1952, p. 172.

Genus *Porphyra*: *P. umbilicalis* (L.) Kütz - add after "f. *laciniata* (Lightf.) J. Ag.", "f. *rosea* Hamel."

Genus *Acrochaetium*: from Mr A. D. Boney - unpublished record for the S. W. coast of England - insert after "*alariae*", "*asparagopsidis* (Chemin) Papenf."

p. 509. Genus *Acrochaetium*: delete "*reticulatum* (Batt.) Papenf."

Genus *Audouinella*: from Mr A. D. Boney - unpublished record - after this genus add the following genus and species:-

Kylinia Kolderup Rosenvinge, 1909
rosulata K. Rosenv.

[Epiphytic on the terminal monosiphonous filaments of *Sporochnus* and *Carpomitra* - S. W. coast of England].

Genus *Rhodochorton*: see J. Feldmann (1954, pp. 68, 69).

Genus *Scinaia*: replace name "*subcostata* (J. Ag.) Chemin" by "*turgida* Chemin" (J. Feldmann, 1954, p. 70).

p. 510. Family Corallinaceae: See Mason (1953) and Hamel et Lemoine (1953).

p. 511. Family Grateloupiaceae: from Prof. G. F. Papenfuss - Cryptonemiaceae (J. Ag.) Harvey (1849) antedates Grateloupiaceae Schmitz (in Engler, 1892).
Genus *Callocolax:* from Mrs D. Irvine - add after "Schmitz", "ex Batters".
Family Choreocolaceae: from Mrs D. Irvine - should read "Choreocolacaceae".

p. 512. Genus *Aglaeothamnion:* see J. Feldmann (1954) concerning this genus, also the genera *Callithamnion* and *Pleonosporium*.
Genus *Ceramium:* from Dr P. Dixon - unpublished record for Cornwall (Aug. 1954) - insert "*codii* (Richards) Mazoyer".
Genus *Corynospora:* add name from Newton (1931) in brackets below - "(*Monospora* Solier)".
Genus *Spermothamnion:* add below "*irregulare* (J. Ag.) Ardiss" "*mesocarpum* (Carm.) Chemin" (= *barbatum* var. *mesocarpum* Batt. in Newton, 1931).

p. 514. Note 23: replace "*Pseudolithothamnion*" by "*Pseudolithophyllum*".

p. 516. Genus *Dermacarpa:* see J. Feldmann (1954, p. 121) - delete "? *violacea* Crn." and add under the genus *Xenococcus* Thuret, "*crouanii* J. Feldm."

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BOURRELLY, P., & DRAGESCO, J., 1955. Contribution a la connaissance d'une algue rarissime *Phaeodactylum tricornutum* Bohlin. *Bull. Micros. Appl.* (2), **5**, 41-44.

DROOP, M. R., 1953. On the ecology of flagellates from some brackish and fresh-water rockpools of Finland. *Acta Bot. Fennica,* **51**, 1-52.

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FELDMANN, J., 1954. Inventaire de la Flore Marine de Roscoff. Algues, Champignones, Lichens et Spermatophytes. *Trav. Sta. biol. Roscoff,* N. S.

FELDMANN, J., 1955. Un nouveau genre de Protofloridée: *Colacodictyon,* nov. gen. *Bull. de la Soc. bot. Fr.* **102**, 23-28.

FØYN, B., 1955. Specific differences between northern and southern European populations of the green alga, *Ulva lactuca,* L. *Publ. Satz. Zool. Napoli,* **27**, 261-270.

HAMEL, G. & LEMOINE, P. 1953. Corallinacées de France et d'Afrique du Nord. *Arch. Museum Hist. Nat.,* 7^{e}ser. **1**, 17-136.

HENDEY, N. I., 1954. Note on the Plymouth *Nitzschia* culture. *J. Mar. biol. Ass. U.K.,* **33**, 335-339.

KORNMANN, P., 1955. Beobachtungen an Phaeocystis-Kulturen. *Helgoland. wiss. Meeresunters.* **5**, (2), 218-233.

KOSTER, J. TH., 1955. The genus *Rhizoclonium* Kütz. in the Netherlands *Publ. Staz. Zool. Napoli,* **27**, 335-357.

LINDAUER, V. W. 1949. Notes on the Marine Algae of New Zealand. I. *Pacif. Sci,* **3**, 344-346.

MANGENOT, G., 1948. Sur les caractères et la position systématique du genre *Phyllosiphon*. *Compt. Rend. Acad. Sci.* (Paris) **226**, 1103-1105.

MASON, L.R., 1953. The crustaceous coralline algae of the Pacific coast of the United States, Canada and Alaska. *Univ. Calif. Publ. Bot.*, **26** (4), 313-390.

PAPENFUSS, G.F. 1952 Notes on South African Marine Algae. III. *J. South African. Bot.*, **17**, 172.

PAPENFUSS, G.F., 1955. A century of progress in the Natural Sciences: 1853-1953. Classification of the Algae. *Calif. Acad. Sci. San Francisco.*

PARKE, M.; MANTON, I., & CLARKE, B., 1955. Studies on marine flagellates, II. Three new species of *Chrysochromulina*. *J. Mar. biol. Ass. U.K.*, **34**, 579-609.

PARKE, M., MANTON, I., & CLARKE, B., 1956. Studies on marine flagellates, III. Three further species of *Chrysochromulina*. *J. Mar. biol. Ass. U.K.*, **35** (2) (In the press).

PRINGSHEIM, E.G., 1953. Salzwasser-Eugleninen. *Arch. f. Mikro-biol.* **18**, 149-164.

SILVA, P.C., 1952. A review of nomenclatural conservation in the algae from the point of view of the type method. *Univ. Calif. Publ. Bot.*, **25**, (4), 241-324.

SILVA, P.C., 1955. The dichotomous species of *Codium* in Britain. *J. Mar. biol. Ass. U.K.*, **34**, 565-577.

WILSON, D.P., 1946. The triradiate and other forms of *Nitzschia closterium* (Ehrenberg) Wm. Smith, forma *minutissima* of Allen and Nelson. *J. Mar. biol. Ass. U.K.*, **26**, 235-270.

Mary Parke,
March 1956.

NOTES AND NEWS ITEMS

A. Société Phycologique de France.

A society has recently been founded in France in order to encourage and develop the study of algae in the widest sense. It is hoped that it will also serve as a link between algologists in France and in other parts of the world. It is proposed that meetings, symposia and excursions may be arranged either in Paris or in the provinces and a bulletin will be issued periodically. The Society will be administered by a Council composed of a secretary, treasurer and four members. For 1956 the composition of the Council is: Mm. P. Bourrelly, M. Chadefaud, P. Dangeard and J. Feldmann. The Secretary is M. Ad. Davy de Virville, P.C.B., 12 Rue Cuvier, Paris 5^{e}, and the Treasurer, Mlle Rubat du Merac, 195 Rue St. Jacques, Paris 5^{e}. The annual subscription is 500 francs, and overseas members will be welcomed.

Members will be gratified to learn that Professor Newton, as President of the British Phycological Society, has been invited to be the first overseas member.

B. Catalogus Algarum Canadensium.

Professor Jules Brunel, of the University of Montreal, and his colleagues are compiling a *Catalogus Algarum Canadensium*, which is now almost complete.

C. Algal Record Cards.

The Phycological Society's Sub-Committee for the Marine Algal Check-List and Flora wishes to draw the attention of all members to a number of points in connection with the use of algal record cards.

It is hoped that as many phycologists as possible will make use of record cards on all the shores they visit and so help the Society to build up as complete a picture as possible of the distribution of marine algae on the British coasts. Such information is urgently needed in the preparation of the Society's proposed Flora of British Marine Algae. For an experimental period, all completed record cards sent in to the Laboratory at Plymouth will be replaced free of charge by the Society. With such records it is very important that for each record sent in the sender should keep an herbarium specimen of the plant concerned, and that such specimens should be available for reference.

Workers giving monographic treatment to special genera are asked to record those counties for which they have been unable to obtain information. In this way, it may be possible that other phycologists can help to fill in some of the gaps

Record cards may be obtained (cost: 3/- per 100) from Dr E.M. Burrows, Dept. of Botany, The University, Liverpool, 3.

D. Schedule for the Description of a Species for the Biological Flora.

The above schedule is listed in Bulletin No. 2, p. 24 without including the description of the thallus. This should be inserted between items 4 and 5.

Illustrations of macro- and micro-scopic features of the vegetative characters (including the whole thallus) and the reproductive organs should accompany the manuscript. A photograph of the type specimen will be accepted, if it is sufficiently good enough for reproduction.

The bibliography should be arranged alphabetically, reference in the text being by author and date; and abbreviations of names of journals should be those recommended in the World List of Scientific Periodicals.

E.M. BURROWS.
Hon. Sec. Sub-Committee for Marine Algal Check-
List and Flora.

PHYCOLOGICAL REFERENCES FOR 1954 AND 1955

The following lists of Phycological papers which appeared during 1954 and 1955 have been compiled by those working on more specialised aspects of Phycological work in the hope that they may be of help to other research workers. It is realised that the lists may be incomplete and the Editor will welcome additions or corrections. The assignment of a paper to a particular category has been in many cases, arbitary, and no attempt has been made to use cross-references. It is hoped to issue in a later number of the Bulletin further lists dealing with other sections of Phycology.

The lists have been drawn up using the standard abbreviations as set out in the World List of Scientific Periodicals and in the form adopted by the Journal of Ecology. Future contributors are asked to conform to this general pattern.

After the authors' drafts had been prepared and just as we go to press, the list of Phycological Literature for 1954 published by the Phycological Society of America (Phycological News Bulletin, **IX** No 26) has been issued; and members' attention is directed to this

CHLOROPHYTA

(List compiled by Dr E.M. Burrows and Dr P. Dixon)

BLIDING, C., 1955. *Enteromorpha intermedia.* A new species from the coasts of Sweden, England and Wales. *Bot. Notiser,* **108**, 253-62.

CHAPMAN, V.J., 1954. The Siphonocladales. *Bull. Torrey bot. Cl.* **81**, 76-82.

CHIHARA, M., 1953. Studies on the life-history of the green algae in the warm seas around Japan. I. On the life-history of *Letterstedtia japonica. J. Jap. Bot.* **28**, 193-200.

CHIHARA, M., 1953. II. On the life-history of *Valonia macrophysa. J. Jap. Bot.*, **28**, 353-61.

CHIHARA, M., 1955. III. on the life-history of *Boodlea coacta. J. Jap. Bot.*, **30**, 9-18.

FØYN BJORN., 1955. Specific differences between northern and southern European populations of the green alga *Ulva lactuca* L. *Publ. Staz. Zool. Napoli.* **27**, 261-270.

GODWARD, M.B., 1954. The 'diffuse' centromere, or polycentric chromosomes in *Spirogyra. Ann. Bot. Lond., N.S.* **18**, 143-56.

HARTOG, C, den, 1955. L'association a *Monostroma wittrockii* et *Porphyra leucosticta* dans de port de Nice. *Rev. algol. N.S.T.* **1**, 167-8.

IRENEE-MARIE, F., 1954. Les petits genres dans la famille des Desmidiacees. *Rev. algol. N.S.T.* **1**, 88-122.

KOSTER, J Th., 1955. The genus *Rhizoclonium* Kütz. in the Netherlands. *Publ. Staz. Zool. Napoli.* **27**, 335-357.

LEWIN, R. A., 1953. The genetics of *Chlamydomonas moewussi* Gerloff. *J.Genet.* **51**, 543-60.

LUTHER, H., 1953. Uber die nordische Verbreitung von *Chaetophora incrassata* (Huds.) Hazen. *Bot. Notiser*, **106**, 317-40.

McVEIGH, I. & BROWN, W.H., 1954. In vitro culture of *Chlamydomonas chlamydogama* and *Haematococcus pluvialis* Flotow. em. Wille. in mixed culture. *Bull. Torrey bot. Cl.* **81**, 218-34.

MANTON, I., CLARKE, B. & GREENWOOD, A.D., 1955. Observations with the electron microscope on bicilliiate and quadricilliate zoospores in green algae. *J. exp. Bot.*, **6**, 126-9.

MARTIBSSON, A., 1955. *Monostroma grevillei* (Thuret) Wittr., a spring alga on the coast of Oland. *Svensk. bot. Tidskr.*, **49**, 252-8.

NAKAZAWA, S., 1955. Plasmolytic polarity in *Cladophora. Bull. Yagamata Univ., Nat. Sci.*, **3**, 1-3.

PALIK, P., 1955. Studies on *Eudorina illinoisensis* (Kof.) Pascher. *Rev. algol. N.S.* **1**, 146-52.

POCOCK, M. A., 1955. Studies on the North American Volvocales. I. The genus *Gonium. Madrono*, **13**, 49-80.

SCHAECHTER, M. & De LAMATER, E.D., 1955. Mitosis in *Chlamydomonas. Amer. J. Bot.*, **42**, 417-23.

SILVA, P.C., 1955. The dichotomous species of *Codium* in Britain. *J. Mar. biol. Ass. U.K.* **34**, 365-79.

SILVA, P.C, & STARR, R.C, 1953. Difficulties in applying the International Code of Botanical Nomenclature to certain unicellular algae, with particular reference to *Chlorococcum. Svensk bot. Tidskr.*, **47**, 235-47.

SODERSTROM, J., 1955. Some drawings of *Cladophora. Svensk. bot. Tidskr.*, **49**, 275-81.

SRINIVASAN, K.S., 1954. On a rare and little-known alga, *Tydemania expeditionis* Weber v. Bosse, new to Nancowry. *Phytomorphology*, **4**, 247-56.

STARR, R.C., 1954. Reproduction by zoospores in *Planktosphaeria gelatinosa* G.M. Smith. *Hydrobiologia* **6**, 392-7.

STARR, R.C., 1954. Inheritance of mating type and a lethal factor in *Cosmarium botrytis* var. *subtumidum* Wittr. *Proc. nat. Acad. Sci., Wash.*, **40**, 1060-3.

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STARR, R. C., 1955. Sexuality in *Gonium sociale* (Dujardin) Warming. *J. Tenn. Acad. Sci.*, **30**, 90-3.

TIFFANY, L.H., 1955. Geographic distribution of the North American species of Oedogoniaceae. *Amer. J. Bot.*, **42**, 293-7.

YACUBSON. S., 1954. Onychonema y Spondylosium, dos generos des Desmidiacees neuves para Argentina. *Bol. Soc. argent. Bot.*, **5**., 148-52.

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(List compiled by Dr K. Drew Baker)

AUSTIN, A.P., 1955. Meiosis in *Furcellaria fastigiata* (L.) Lamour. *Nature, Lond.*, **175**, 905.

BOURRELLY. P., 1955. Quelques stations françaises d'*Hildenbrandia rivularis* (Liebm.) Breb. *Rev. algol. N.S.* **1**, 168.

BOURRELLY, P., 1954. *Cyanoderma*, algue des poils des Paresseux. *Rev. algol. N.S.* **1**, 122.

CHADEFAUD, M., 1954. Sur la morphologie de quelques Céramiacées. *Rev. algol. N.S.* **1**, 71.

CHOUI. H, 1954. New species of *Porphyra*, epiphytic on *Chorda filum* from Hokkaido *Bul. Fac. Fish. Hokkaido Univ.* **5**, 231-9.

DESIKACHARY, T.V., 1955. On a *Helminthora* from New Zealand, *Amer. J. Bot.* **42**, 126.

DREW, K.M., 1955. Life Histories in the Algae with special reference to the Chlorophyta, Phaeophyta and Rhodophyta. *Biol. Rev.*, **30**, 343.

DREW, K.M., 1955. Sequence of Sexual and Asexual Phases in *Antithamnion spirographidis* Schiffner. *Nature, Lond.*, **175**, 813.

DREW, K M., 1954. Studies in the Bangioideae. III. The life-history of *Porphyra umbilicalis* (L.) Kütz. var. *laciniata* (Light.) J. Ag. *Ann. Bot. Lond. N.S.* **18**, 183.

DREW, K M., 1954. The life-history of *Porphyra*. *Nature, Lond.*, **173**, 1243.

DREW, K.M., 1954. The organization and inter-relationships of the carposporophytes of living Florideae. *Phytomorphology*, **4**, 55.

FELDMANN, J., 1954. Recherches sur la structure et le développement des Calosiphoniacées. *Rev. gén. Bot.*, **61**, 453-499.

FELDMANN, J., 1954. Inventaire de la Flore Marine de Roscoff. *Trav. Sta. Biol. Roscoff*, supp. **6**.

FLINT, L.H., 1954. *Nemalionopsis* in America. *Phytomorphology*, **4**, 76-79.

GEITLER, L., 1955. Die atmophytische Bangioidee *Rhodospora*. *Öst. bot. Z.*, **102**, 25.

GRAVES, J., 1955. Life-cycle of *Porphyra capensis* Kütz. *Nature, Lond.*, **175**, 393.

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HASEGAWA, Y., & FUKUHARA, E. 1955. Ecological studies on *Iridophycus cornucopiae* (P. & R.) Setch. et Gardn. 3. On the seasonal change in the number of female gametophytes and tetrasporophytes, II. 4. On the liberation of carpospores and tetraspores. 5. On the seasonal and local variations in the weight of fronds. *Bul. Hokkaido Reg. Fisheries Res. Lab.* no. 12.

HUVÉ, H., 1954. Sur des fonds à *Peyssonnelia polymorpha* (Zan.) Schmitz. de la région de Marseille. *C. R. Acad. Sci. Paris* **238**, 152.

HUVÉ, H., 1954. Contribution à l'étude des fonds à *Peyssonnelia polymorpha* (Zan.) Schmitz. de la région de Marseille. *Rec. Trav. Sta. Mar. d'Endoume.* **12**, 119.

ISAAC, W. E. & SIMONS, S. M., 1954. Some observations on *Gigartina pistillata* (Gmel.) Stackh. from Port Alfred, with a record of plants bearing both tetraspores and carpospores. *J. So. Afr. Bot.*, **20**, 117-124.

JONES, J. R., 1955. Notes on the alga *Compsopogon*. *J. Lin. Soc. Bot.* **55**, 261.

LAWSON, G. W., 1954. Agar from *Gracilaria henriquesiana*. *Amer. J. Bot.*, **41**, 212.

MIKAMI, H., 1954. A New Species of Neodilsea: *Neodilsea tenuipes* Yamada et Mikami. *Sci. Pap. Inst. Algol. Res. Hokkaido Univ.*, **4**, 83.

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RAO, C. S. P., 1954. Aceto-carmine as a nuclear stain in Rhodophyceae. *Nature, Lond.*, **172**, 1197.

SEGI, T., 1954. The new species of *Herposiphonia* from Japan. *Rep. Fac. Fish. Univ. of Mie.* **1**, 365-371.

SILVA, P. C. & CLEARY, A. P., 1954. The structure and reproduction of the red alga, *Platysiphonia*. *Am. J. Bot.*, **41**, 251-260.

TANAKA, S. & KOMIYAMA, T., 1954. On the development of young stages in *Digenea simplex* (Wulf.) C. Ag. *Mem. Fac. Fish. Kagoshima Univ.* **3**, 73-75.

WALKER, M. I., BURROWS, E. M. & LODGE, S. M., 1954. Occurence of *Falkenbergia rufolanosa* in the Isle of Man. *Nature, Lond.*, **174**, 315.

ZINOVA, A. D., 1955. Classification and taxonomy of red seaweeds of the Northern Seas of U. S. S. R. pub. Moscow.

The following papers dealing with the Rhodophyta were read at the VIIIth. International Botanical Congress (Paris, 1954), and summaries of them are to be found in the Rapports et Communications a la Section 17.

AUGIER, J. Biochemie et systématique chez les Rhodophycées. 30-32.

DANGEARD, P. Contribution à la connaissance du cycle évolutif des Bangiacées. 76-79.

DILLON, S. The Polysaccharides of the red algae. 29-30.

FELDMANN, J. & FELDMAN, G. Sur l'origine des Floridées parasitic. 110-112.

FUNK, G. Epiphytes spécialisés et endophytes parmi les algues marines surtout parmi quelques Floridées. 107-109.

KUROGI, M. Life-history of *Bangia* (Preliminary Report). 74-76.

POCOCK, M.M. Three small parasitic red algae from South Africa. 109-110.

SEGAWA, S. & CHIHARA, M. On the germination of carpospores in *Asparagopsis hamnifera* (Hariot) Okamura. 79-82

PLANKTON

(List compiled by Dr Mary Parke)

ANTIPOVA, N.L., 1955. New species of the genus *Gymnodinium* Stein, from Lake Baical. *C.R. Acad. Sci. U.R.S.S.* **103**, 325-328.

BOURRELLY, P., 1955. Cinq années d'algologie d'eau douce (1950-1954). *Bull. Soc. bot. Fr.*, **102**, 134-190.

BRAARUD, T., 1954. Studiet av planktonalger i elektronmikroskop. *Blyttia*, **12**, 102-108.

BRAARUD, T., 1954. Coccolith morphology and taxonomic position of *Hymenomonas roseola* Stein and *Syracosphaera carterae* Braarud & Fagerland. *Nyt. Mag. Bot. anik.*, **3**, **1-4**.

CONOVER, S.A.M. 1954. Observations on the structure of red tides in New Haven Harbor, Connecticut. *J. Mar. Res.*, **13**, 145-155.

CONRAD, W. & KUFFERATH, H., 1954. Recherches sur les eaux saumâtres des environs de Lilloo. II. *Mém. Inst. sci. nat. Belg.* **127.**

CURRIE, R., 1955. The "Red" Sea? *Port of Aden Annual*, 1-4.

DROOP, M.R., 1954. Cobalmin requirement in Chrysophyceae. *Nature, Lond.*, **174**, 520.

DROOP, M.R., 1955. Some new supra-littoral Protista. *J. Mar. biol. Ass. U.K.*, **34**, 233-245.

FOTT, B. 1955 Scales of *Mallomonas* observed in the electron microscope. *Preslia*, **27**, 280-282.

GAARDER, K.R., 1954. Coccolithineae, Silicoflagellatae, Pterospermataceae and other forms. *Rep. Sars. N. Atl. Deep Sea Exped.* **2**, 1-20.

GAARDER, K.R., MARKALI, J. & RAMSFJELL, E., 1954. Further observations on the coccolithophorid, *Calciopappus caudatus*. *Avh. norske. Videns. Akad.*, **1**, 1-20.

GAARDER, K.R. & RAMSFJELL, E., 1954. A new coccolithophorid from northern waters, *Calciopappus caudatus* n. gen., n. sp. *Nyt. Mag. Bot. anik.*, **2**, 155-156.

GALTSOFF, P.S. (Ed.). 1954. Gulf of Mexico: its origin waters and marine life. *Fish. Bull. U.S.*, **89**, no. 55.

GILLBRICHT, M., 1955 Wucherungen von phytoplankton in einem abgeschlossenen Hafenbecken. *Helgoländ. wiss. Meeresunters.*, **5**, 141-168.

GRØNTVED, J., 1954 Planktological Contributions. No. I. *Medd. Dan. Fisk. Havrundersøg.*, **n.s. 1**, no. 8.

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